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CHEMICAL AGE

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BEHIND THE CURTAIN

RUSSIAN intentions regarding its chemical industry announced last week have undoubtedly given much food for thought in this country, the US and Western Germany. Over the next few years the Soviet Government plans development of the industry at a stated cost of £8,900 million. Complete chemical plants are likely to be sought, and, indeed, it was recently suggested that some 16 such plants would be bought from the UK. The Russians also want processes, particularly in the plastics, synthetic fibres and resins fields; and according to Mr. Krushchev, they wish to avail themselves of the services of scientists, engineers, inventors and technologists of foreign countries which might be helpful in solving Russia's problems of raising the production of plastics and synthetic fibres.

Last December this journal (21 December, p. 1009) revealed that there had been a lack of co-ordination in the Soviet chemical industry. In fact, in July of last year there was a reorganisation of control and the appointment of a new minister for the chemical industry. The new minister indicated that special attention had to be given to new plant in overtaking the arrears in Russia's chemical industry development. In particular, he referred to synthetic rubber and alcohol, plastics, artificial fibres, fertilisers with raw materials for these.

Successful launching of USSR Sputniks I, II and III, with their implications of advanced metallurgical and electronic techniques, have tended to suggest a much greater advancement in Russia's chemical and allied industries as a whole. But from the recent announcements it appears that the Sputniks have been produced at the cost of developments in other fields—which in the Western world have increased prosperity and have assisted greatly in raising living standards.

Reference was made in the Russian journal *Khim. Prom.* last year (CHEMICAL AGE, 26 April, p. 764) to the difficulties that hinder the expansion of automation in a complex field such as the chemical industry. It was urged that more attention should be paid in higher technocological institutions to the training of students in automatic control methods and that laboratories, etc., should be better equipped with modern automatic control apparatus.

Professor Nikolai Melnikov, head of the Moscow Institute of Fertilisers and Insecto-Fungicides, in a paper on trends in the development of the Russian chemical industry, read to a joint Canadian-US engineering conference in Montreal at the end of April, stated that volume output of the USSR chemical industry in 1956 was 4.7 times that of the pre-war (1940) level: synthetic fibres had increased 1,160 per cent; plastics 855 per cent; mineral fertilisers 336 per cent; sulphuric acid 271 per cent; and automobile tyres 376 per cent. However, nowhere have actual Russian production figures been published.

Elsewhere in this journal (p. 955) problems of the Soviet plastics industry are discussed and the growth of this industry in relation to Soviet industry as a whole is indicated.

The picture, as seen in the light of the above information, is of a Russian chemical industry that is behind those of the US, the UK and Western Germany, in fields outside of Russia's defence needs. If this idea is accepted,

and it is felt that it must be, having regard to the recent Russian announcements, the problem in front of the Western world is 'How far should the Russian chemical plant orders and "know-how" requests be fulfilled?'

There are many in the Western world who believe that in a few years' time there will be Soviet products underselling UK, US and Western European countries in world markets for the sake of Soviet prestige. In the metals field, this has already happened. Only last week it was announced that Johnson Matthey and Co. have again reduced their price of platinum to a new low of £25 per troy ounce. A comparative reduction has also taken place in the US (CHEMICAL AGE, 17 May, p. 918) and US industry sources are again blaming Russian sales and barter offerings.

From Brazil have come reports of Iron Curtain chemicals being offered at attractive prices for immediate delivery. Russian potash is available in the US and Far East, while Russian, and even Chinese caustic soda, is being sold in Hong Kong.

In this country, Eastern European activities in chemicals are being watched closely, particularly in regard to the Middle East countries. British chemical leaders, we believe, consider that Russia's main efforts will be directed towards the Middle East and India. Such competition could cause much concern here for, as in the platinum markets, Russia would undoubtedly be prepared to sell at a loss to cause political trouble by dumping chemicals, etc.

Soviet chemicals and pharmaceutical tie-ups in Egypt and India are worth noting. In the past three years, Russian teams of chemical experts have visited India, China and Middle East countries, notably Egypt. One of the latest reports indicates a close liaison between Russia and Egypt in the pharmaceutical field, with Russia building plants and factories in Egypt and providing scientists to man them.

It is realised that if Russia orders complete plants within the next few months, she will receive plants which are of present-day construction and similarly this applies to processes and know-how. If it is assumed that the plants and factories take two years before they come into operation, the Russian chemical industry would be that period of time out of date.

At the moment, the UK and US may be ahead of the USSR in their chemical industries, but it must not be forgotten that our technical lead is likely to be overtaken and surpassed by virtue of the USSR's tremendous scientific training schemes and research and development potentialities. Much has been heard of late of Russia's 750 institutes of higher learning, including 195 technical schools, with a total registration of 700,000 students at the present time. In 1956, the USSR had 12,000 graduates in the pure sciences and 60,000 in the applied sciences against the UK's corresponding figures of 5,000 and 2,800. From the Technicums about 70,000 students qualify each year, compared with about 9,000 with Higher National Certificates in the UK.

Also to be considered is the Russians' first-class intelligence and translation services, the wide circulation of scientific journals, and their adoption of techniques of value unhindered by any patent law.

Very pertinent to the problems to be associated with Russia's acquisition of plants and processes, is the question of the development of chemical industries in each of the USSR's satellites. There is every likelihood of competition in world markets from the satellite countries.

At present the Communist countries are unable to produce enough chemicals, and particularly pharmaceuticals, for domestic needs. Growing fast in India are imports from Czechoslavakia, Poland, Bulgaria, Rumania and Hungary. It is even suspected that these countries are passing their products to China for distribution elsewhere. Switzerland, Denmark and Holland have been suggested as being similarly used. The volume of trade, as far as can be judged, is negligible at present, but as more chemical factories become operative, and productive capacity is built up, this volume could increase.

Of all the satellite countries, Hungary seems to be the furthest ahead, especially in pharmaceuticals. With the present world sympathy for Hungary, the USSR may see in this satellite country, a valuable means of a Communist push for export trade in chemicals and drugs. Rumania, with her oil fields, has petrochemical interests and a notable antibiotics production unit. Poland is exporting penicillin and with Russia's help expects to have a streptomycin plant operating by next year. Czechoslavakia has been offering chemical intermediates and new pharmaceutical materials to Western countries. Very little is known about Bulgaria.

There are, as yet, no direct or immediate threats to this country or the US, but a careful watch is no doubt being kept on activities in East Europe. At the moment the main threat appears to be in Far Eastern markets, particularly India, which for years has been a main market for the UK.

The UK, the US and West Germany should, with all this in mind, consider very carefully Russian chemical industry plans, both from economic and political aspects. In the meantime we, in this country, must consider long-term plans; the Government should assist the UK industry to build up its strength by reducing taxation and by its adequate support of education ensure the supply of trained men to the plants.

PROPYLENE PURITY

PRESENT day usage of propylene in allylchloride, acrolein C_4aldehydes and alcohols, plus its potentially widespread use in making polypropylene, is leading to a need for higher purity than previously. A recent report presented by Monsanto Chemicals, US, before the Division of Petroleum Chemistry in an ACS symposium on 'Developments in chemicals from petroleum', indicates that propylene of 99 per cent purity is required.

Economically, of course, propylene owes its position as a basic chemical to its production as a by-product or a co-product from refinery operations and ethylene plants.

The greater part of propylene output comes from refineries where a propane-propylene mixture (of 40 to 60 per cent propylene content) is produced as a by-product of cracking petroleum. Propylene produced in ethylene plants by propane pyrolysis has a purity of the order of refinery-produced propylene; if butane and heavier hydrocarbons are used, purity is of the order of 90 per cent.

Having regard to the present chemicals for higher purity propylene, it is of interest to note the Monsanto workers cost studies on purifying propylene. Practically, the best method of purifying propylene is considered to be by distillation, but storage is expensive (30 to 50 cents per gallon, owing to the high vapour pressure of propylene.)

Cost studies have been carried out for pressures of 300 and 100 to 200 p.s.i., based on an 11.5 million-gallon-per-year plant, with a liquid feed containing a 50-50 molar mixture and with 90 per cent recovery of propylene. Bare conversion cost premium to be placed on high purity propylene is stated to be 2.5 cents a gallon (2.23 to 2.52 cents). If propylene in the feed mixture is worth 6 cents a gallon for polygasoline use, the basic cost of high purity propylene is reported to be about 8.5 cents.

The Monsanto workers estimate capital cost for such plants at from $520,000 to $720,000, excluding integration with existing process units and service facilities. To upgrade 90 per cent propylene to 99 per cent purity a conventional single column distillation unit can be used. Cost of a plant of the same size and conditions give conversion costs of 1.07 cents direct and 0.46 cent indirect. Capital cost of such a plant is estimated at $228,000. Extractive distillation has also been studied by the Monsanto investigators, but is stated to be not competitive.

AEA BUILD NEW URANIUM CONVERSION PLANT

Larger Chemical Separation Works Planned

AMONG new developments on the part of the UK Atomic Energy Authority is the building of an extensive new plant to convert uranium ore into metallic fuel elements. This will be followed by a plant for ceramic fuel elements. The chemical separation plant at Windscale is to be enlarged to provide a central processing facility for the whole UK nuclear power programme.

This was stated by Sir John Cockcroft, the AEA member for scientific research, at the conference in Brussels on 17 May of the British Electrical and Allied Manufacturers' Association.

The AEA, said Sir John, expected to be able to supply natural uranium Calder type fuel elements for the early UK nuclear power stations and for similar stations exported at a maximum price of £20,000 per metric ton. The repurchase price of spent fuel elements would not be less than £5,000 per metric ton. That figure took account of the fact that the spent fuel elements would contain rather more than 2 kg. of plutonium. This could be used by recycling it with some of the depleted uranium, thereby reducing the natural uranium feed by a factor of about three; that was the basis for the 'buy-back price'.

Plutonium could also be fed to fast breeder reactors which after an initial charge of several hundred kilos would produce 50 to 60 per cent more plutonium than they consumed. Another use was in small reactors of the pressurised water reactor or organic liquid moderated type for use in propulsion units.

Calder Hall Experiments

Sir John described investigations being carried out into the performance of fuels at Calder Hall which were providing information for the design of the next generation of nuclear power stations. He mentioned that in Calder Hall, six fuel elements were stacked vertically one above the other in each channel, so that the bottom elements were heavily loaded. The additional radiation-induced creep caused the lower elements to bow like struts. This had been prevented by fitting additional central supports for the fuel elements. In future designs, the weight of each element would be taken by the graphite.

During 15 months of operation of the first charge of No. 1 reactor of Calder Hall, only three fuel elements out of 10,000 developed slight leaks in the magnox sheath. This resulted in a slow inleakage of carbon dioxide leading to slow oxidation of the uranium metal and a corresponding small outleakage of fission products into the circulating gas. When the faulty fuel elements were examined under water by radiography it was usually possible to see a slight bulge caused by the oxidation. It ppeared that the very slow expansion of the uranium fuel due to irradiation could strain the magnox can sufficiently to cause a few such faults to develop. The grain size was being changed to increase the ductility of the magnox.

Experience had also been gained in the magnitude of the CO_2-graphite reaction leading to carbon monoxide. Radiation could increase the rate of reaction a thousand-fold over the thermal component of the reaction. Calder Hall experience had shown that the concentration of carbon monoxide increased on start-up and then flattened off at a fraction of 1 per cent. That agreed with the predicted result and did not present any problems.

Present indications were that it would be three to five years before it would be advisable to anneal the graphite and release the energy stored in it. The Calder Hall design provided for raising the temperature of the graphite by recirculating part of the CO_2 without passing through the heat exchanger. This could allow the energy to be released under conditions of coolant flow which would make any excessive temperature rise impossible. Sir John added: 'We may well find operating conditions in which an energy release may never be necessary'.

Design Progress

Calder Hall experience had enabled major steps forward to be made in design. The Berkeley and Hunterston power stations would have spherical pressure vessels 70 ft. in diameter and the Bradwell station would have cylindrical reactor vessels 50 ft. in diameter. The larger graphite core which could be accommodated enabled the amount of uranium in the fuel elements to be doubled. Because of greater wall thickness, the gas pressure could be raised by about 50 per cent. The heat ratings of the fuel elements were approximately doubled. These factors would produce a four-fold increase in output over Calder Hall. These developments would reduce capital costs and the cost of nuclear power in the UK should break-even with the cost of power from coal-fired stations by 1962. Thereafter nuclear power costs were likely to fall below that level.

It was also necessary to reduce the cost of heat exchangers and turbo alternators; that could best be done by raising the temperature of operation of the fuel elements, which would increase the gas outlet temperatures.

The AEA was developing a prototype of an advanced gas-cooled reactor which aimed at meeting those requirements. The reactor would have sintered uranium oxide fuel elements probably sheathed in beryllium metal. Sintered uranium oxide had a melting point of 2,400°C but had a low thermal conductivity. So the fuel elements would consist of a cluster of small diameter rods which should allow the heat rating of the fuels to be raised three- or four-fold to the region of 8 Mw per ton average. Overall fuel costs should be about the same as that of the 1960 power stations, about 0.16d per unit.

It was believed that when the third generation of nuclear power stations came into commission in the second half of the 1960's they would be near to meeting the prediction of Sir Christopher Hinton that by 1970 the overall cost of electricity for nuclear power stations would be about 0.47d per unit.

The development work to carry out this programme required the services of about 150 scientists and engineers, backed by the help of UK industry. The AEA also had three powerful materials-testing reactors, DIDO and Pluto at Harwell, and DMTR at Dounreay. The authority was already irradiating in DIDO specimens of uranium oxide fuel elements sheathed in beryllium to study the irradiation stability. New shielded facilities for examination had been built; some of these cells were provided with TV viewing equipment which enabled micrographs of the fuel structure to be obtained after irradiation. Also under study was the CO_2-graphite reaction at the higher temperatures which would be characteristic of the advanced gas-cooled reactor (AGR).

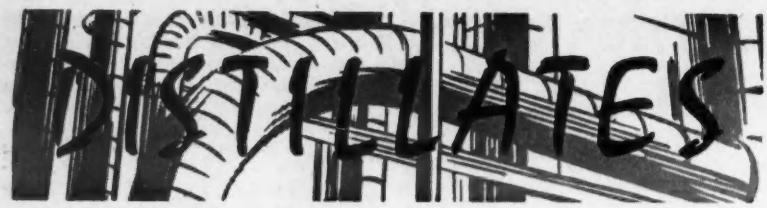
The AEA had not lost sight of other promising routes to nuclear power and an intensive research study was being made on the heavy water gas-cooled reactor. Economic prospects seemed to be about the same as those of the AGR. Technological factors would probably decide which of the two was likely to lead in the reactor race of the late 1960's.

ISCOR Plans for Widnes Works

MR. M. I. FREEMAN, director of operations for the Imperial Smelting Corporation, explained to a recent meeting of 60 representatives how the directors are actively engaged in finding substitute products to keep employment at a full level at the Orr's Zinc White Works, Widnes. He said:

'Over the years, demand for lithopone has been falling with the increased availability of titanium dioxide. While recognising that titanium was bound to make severe inroads into our former lithopone trade, we believe there will always be a requirement to meet applications where titanium pigments have not been found acceptable. Our policy is to maintain as high a production as possible by home and export sales, and in order to keep costs reasonable, to build up other productions which fit into Widnes operations'.

Demand for barium compounds during the year was sufficient to absorb the full plant output. 'Vidox', the third grade of zinc oxide to be marketed by the company, made a substantial contribution to last year's output. This new grade had a particular application in the rubber industry. Initially, customers were understandably cautious in adopting a new product, but contracts had now been made which would absorb the first campaign production, and production would shortly restart.



★ FOLLOWING the mention in the House of Commons early last week that an unspecified third company was in production of a poliomyeletis vaccine, I was interested the following morning to see that about four newspapers mentioned the company—Pfizer Ltd.—by name. Pfizer, of course, have been producing this vaccine for some time, but no official company announcement has been made, or, I gather is likely to be made for the time being. The 'leak' would appear to have come from Ministry circles as until last week most people seemed to connect companies other than Pfizer as potential new producers.

Pfizer are believed to be in production on a large scale. Their reluctance to say anything about the project is natural in view of the premature publicity that greeted previous UK polio vaccines. The company can be expected to make an announcement once the Medical Research Council tests have been completed; these take six weeks.

★ THE 'blue bag' of the pre-war washtub is in many areas becoming a thing of the past. Doubtless the ever increasing use of optical whitening agents in soaps and detergents has had a hand in this trend. Altogether there are now 30 or more manufacturers in the world; they are producing a range of between 150 and 200 different optical brightening agents. More than 100 British patents have been granted.

These figures were given by Dr. D. A. W. Adams, research and development director of Hickson and Welch, when he recently addressed West Riding junior members of the Society of Dyers and Colourists. Dr. Adams added that US production in 1955 totalled 1,375 tons, double the figure in 1952. Production had continued to rise and a sales value of $15 million had been quoted. He estimated that world production must now be at least 2,500 tons. Over the years prices have fallen steadily to figures of between 15s and 40s per lb. depending on strength, complexity, etc.

★ FOLLOWING recent news in CHEMICAL AGE (15 February, p. 313) that L. H. Manderstam and Partners had been awarded a contract for rebuilding the potash plant at the north end of the Dead Sea, I was interested in a recent issue of *Middle East Business Digest*. This proclaimed that the company had recommended the setting up of the phosphate plant at Akaba. The Review continues 'While this means a higher local selling price, the overall benefit comes in the more competitive export price, and the heavy ratio of prospective exports to internal consumption, at least for some time to come'.

Initial cost of the plant, to be discussed at early board meeting of the Phosphate Co. is about JD.250,000. Output is said to be some 30,000 tons a year. In view of the estimated export price, it is stated that Manderstam believe that other Arab countries would be customers, as would countries in the Mediterranean.

The company has accepted an East German offer to buy 20,000 tons of phosphates.

★ MOST people usually associate cyanide with the type of sudden death favoured by fiction writers. However, some bacteria thrive on the stuff and their ability to do so may be of importance to industry.

Experiments are in hand at the Oldbury works of ICI general chemicals division to make it easier for customers who use cyanide salts in heat treatment processes to 'clean up' the weak cyanide solutions they are left with. In a cylindrical tower, known as the 'bug tower', colonies of the cyanide-eating bacteria have been cultivated on a packing of coke.

Cyanide solution is pumped to the top of the tower and discharged at regular intervals over the coke. As the solution flows down the tower the cyanide is removed by the bacteria. The effluent from the bottom of the tower can safely be sent down the sewer.

At present cyanide solutions are made harmless by using sodium hypochlorite. But none will deny the obvious advantage of using bacteria; they work 24 hours a day and 365 days a year without incentive or supervision.

★ HEARTENING news for those who believe that Britain's future prosperity lies largely in an ever increasing supply of trained scientists, engineers and technologists. On Monday this week Sir Alexander Fleck opened the chemical engineering building at the Manchester College of Science and Technology (see p. 951).

Also gratifying is the announcement that Cambridge University is to build the Churchill College at a cost of £3½ million. By far the larger part of the facilities will be for science, a notable departure from tradition. Already £1 million is reported to have been contributed.

Oxford University also has plans for a large new college. Facilities will be equally divided between the faculties of science and arts. At the moment the project is somewhat overshadowed by the university's restoration fund. In both cases, the universities will depend largely on industry to finance the new college. I have little doubt that industry will not be found wanting; although in the case of the new Manchester building I am sorry to say that lack of funds preclude the immediate purchase of all the costly equipment needed for the pilot plant section.

★ THE nation is becoming overfed yet undernourished under the present system of agricultural production with the extensive use of artificial fertilisers. Many will disagree with this controversial statement recently made by Dr. R. F. Milton, scientific adviser for the Soil Association experiments on organic farming at Haughley, Suffolk. He thinks that people in the UK get too much bulk and not enough high quality food.

Comparing crops and livestock results obtained over six years in the Haughley comparative experiments with organic and inorganic materials as fertilisers, he said that soil which had received nothing but 'artificials' had shown steady deterioration. On the other hand, soil had greatly improved under organic farming. The dairy herd on the organically farmed land also had a high milk output despite the smaller volume of grass.

★ READINESS of the Society of Dyers and Colourists to take part in any international liaison which may develop as a result of association with the International Federation of Textile Chemists and Colourists was expressed by Mr. John Boulton, newly-elected SDC president, at the annual dinner in Glasgow recently.

Mr. Boulton was discussing the problems associated with the proposed European Free Trade Area. He said that the problems under an FTA would be greater if freedom to trade was not matched with energetic dissemination of technical knowledge. 'We must be prepared in our industry to take part in a flux of investigation, research and development which is bound to be concomitant with any free trading area that hopes to succeed.'

I was amused to learn from Mr. Boulton's speech of the origins of the Scottish section of the SDC, now celebrating its 50th year. In 1908 someone said, 'at present there are more members of the society in Japan than in Scotland.' Thus goaded, a few devotees got together and in a very short time a Scottish section was in existence.

★ NEWS reaches me of a new computer controlled pilot plant designed to save scientific manpower and reduce the time needed to develop new catalytic refining processes. It is under construction at the Consolidated Electrodynamics Corporation of Pasadena, Ca, for Esso Research and Engineering, Linden, US. I learn that the plant will be used to evaluate small-scale processes and will automatically provide a complete chemical analysis of samples of one drop of liquid. Weeks rather than months will be the time taken to explore a new process.

Alembic

FLECK ON SOVIET CHEMICAL PLANS

Opening of College's Chemical Engineering HQ

THE new chemical engineering building of the Manchester College of Science and Technology was formally opened by Sir Alexander Fleck, chairman of ICI on Monday. Councillor M. P. Pariser, chairman of the college council presided at the ceremony, accompanied by the Lord Mayor of Manchester, Professor W. Mansfield, vice-chancellor, and Dr. B. V. Bowden, principal. The thanks of the college and of the chemical engineering industry to Sir Alexander were expressed by Sir Hugh Beaver, president of the Federation of British Industries and of the Institution of Chemical Engineers.

Referring to the Soviet plans to spend thousands of millions of pounds over the next few years to develop the country's chemical industry, Sir Alexander Fleck told those present that he would like them to think what that was going to mean.

In the immediate future, Russia would spend a large part of that money in the West, but having spent it it would mean that the products of chemical engineering would not be confined to Russia, but would go out all over the world, and play a very important part in our industrial and commercial world.

Fully Competitive

One way in which the UK could meet this was to be fully alive, fully developed and fully equipped for chemical engineering so that our processes were beyond compare. It was towards that kind of idea, he was sure, that the new building would play such an important part.

Sir Alexander, who was the first hon. fellow of the college to have spoken at the college in that status, referred in his speech to three new developments in the field of technology.

The first was the proposed Churchill College at Cambridge. The fact that there would be a college devoted to technology allied to Cambridge's link with what he termed the humanities, would be a great thing for Cambridge University.

Secondly, there was the significance of what was happening in India today. Sir Alexander had recently visited that country and he had seen there a very decided development of technology. Appreciation of research was one thing and its application by technology was another and until recently technology had tended to be rather in the background in India.

Sir Alexander considered it of great significance that research had now penetrated into the lives of Indians. As an example he instanced the development of a dyestuffs industry and allied to the technological aspect they had not lost sight of the aesthetic, so that one had well-laid-out buildings, a large number of trees planted, while at one factory, there was a Grecian theatre so that the workpeople and those from outlying villages could appreciate the arts. Another example was that the Indians were developing lignite. Here 10 tons were being moved every 50 seconds at a rhythm and precision which could not fail to impress anyone who saw it with the rise and development of an industrial organisation.

The third technological development was the latest Soviet sputnik. This was of great significance for it meant planning and craftsmanship. To the best of Sir Alexander's knowledge, the UK turn out about 60 technologists per million of population; the Russians were producing about 200 per million. In the race for economic development, those figures were of considerable significance.

At the opening ceremony, l. to r., Sir Alexander Fleck, Sir Hugh Beaver, H. Fairhurst, architect for the new building, and Professor Frank Morton, of the department of chemical engineering, fuel technology and metallurgy

Lack of Funds Delays Full Equipment of Pilot Plant Facilities

The department is housed in a former cotton mill in Jackson Street which was acquired in 1956 and converted at a cost of £488,000, including laboratory and pilot plant furnishings, but not the cost of equipment required for teaching. The constructional work took 15 months and was completed in January this year, some six months ahead of the original schedule.

The building comprises basement, ground floor and six floors, totalling about 120,000 sq. ft. and is separated from a five-storey block, with 32,000 sq. ft. by a main staircase and lift shafts. In addition to housing the department of chemical engineering, fuel technology and metallurgy (under Professor Frank Morton), the new facilities also house the department of chemistry (Professor R. N. Haszeldine and Professor T. K. Walker), the department of textile

Upper floor of the main chemical engineering laboratory

At the opening of the new building, l. to r., Professor M. W. Thring, professor of chemical engineering, Sheffield University, Sir Hugh Beaver, C. A. Curtis, staff lecturer at Manchester College and former technical manager with Clayton Aniline Co.

chemistry (Professor R. H. Peters) and the department of mechanical engineering (Professor H. Wright Baker).

The main basement is used by the mechanical engineering department for the strength of materials and fatigue testing laboratories; a portion is also used as the bottom storey of the chemical engineering laboratory which extends through to the ground floor, thus providing access to pilot plants at two levels.

On the ground floor are the main lecture theatre and chemical engineering teaching laboratories. The main chemical engineering laboratory is entered from a central hall, which has facilities for student refreshment. On the ground floor of this laboratory, three large sections have been removed from the floor to form the two-storey pits through which extraction columns, distillation, columns, evaporators, etc., are built. A gallery has been erected 10 ft. above ground level on the northern wall to facilitate the operation of these units.

On the first floor are the design office of the department, with research laboratories, conference room, library and office facilities for the chemical engineering staff, and lecture rooms. Similar provisions are made on the upper floors for the teaching of metallurgy and fuel technology on the second; for textile chemistry on the third; for industrial biochemistry on the fourth; and for machine drawing on the fifth.

Services are provided through ducts extending from basement to the top floor. Except for the ground floor, headroom on any floor is not sufficient to allow the construction of false ceilings for masking the various services; these are brought to the benches along the ceiling of the floor beneath. As several of the laboratories were to be used for both undergraduate teaching and research, the provisional layout was made on the basis of the maximum number of benches which could be included in any given laboratory area; but not all these services are employed.

A large sound-proofed lecture room fitted with cinema and sound projection equipment will seat 130 students; there are 14 other lecture rooms, seating from 20 to 60. The chemical engineering drawing office provides working space for 60 students.

Further extensive pilot plant buildings have been started outside the main chemical engineering building on the area between the River Medlock, where two large prefabricated steel buildings have been erected. As the provision of pilot plant equipment, pumps, condensers, fractionating columns, reboilers, etc., is expensive, the pilot plant buildings will not be completely equipped until the end of 1960. The students have started design of the first pilot plant, which is to be a tar washing unit; it is hoped to start building this unit in the summer.

Chemical Merchants Urged to Study New UK Tariff

TALKS between the British Chemical and Dyestuffs Traders' Association and the Board of Trade on the position of a number of chemicals in the rewriting of the UK tariff in Brussels nomenclature form are referred to in the association's annual report. This was presented at the annual meeting in London on 21 May.

Members have been able to study the various chapter headings of the new tariff and have had the opportunity of submitting through the association claims for revision so as to preserve the existing rate of duty on a particular chemical. Negotiations are likely to continue for some time.

The report continues that the assimilation of Key Industry Duty chemicals to the general tariff involves changes in classification and members are urged to examine closely the provisional new tariff list when it is published in July next; and to report to the association instances where further revision could be justified.

It is stated that the association has continuously pressed for the repeal of the Safeguarding of Industries Act. This is now to be replaced by the single comprehensive measure in the Import Duties Act, 1958 and, says the report, the new simplified procedure for dealing with applications for import duty revision has much to commend it. The association has been informed that when the Act comes into operation on 1 January, 1959, it will be open to any party, not necessarily a consumer, to make out a case for the temporary suspension of duty.

Dealing with the Customs Duties (Dumping and Subsidies) Act, the report states that the question of piperazine is still being considered.

Representations made on behalf of interested members opposing the application for a revision of the method of charging import duty on alkyd resins were also being considered.

On the subject of a European free trade area, the report refers to the provision of a satisfactory agreement on 'rules of competition and definition of origin.' It is stated that 'As merchants with experience of the working of the British Commonwealth preference system we can see no insuperable difficulty in applying a carefully-designed system of certificates of origin. It should aim at being as simple as possible and avoid any unnecessary procedure likely to hamper the prompt movement of goods.'

Name Changed to Accord With Modern Conditions

THE Association of British Insecticide Manufacturers has changed its name to the Association of British Manufacturers of Agricultural Chemicals (Insecticides, fungicides, herbicides).

In a statement the association says when it was formed in 1928 its functions were concentrated wholly on insecticides and fungicides. Today weedkillers are probably the most important products and it was considered that the old name was no longer truly descriptive.

Of even greater importance in deciding a new name was the possibility that in the not too distant future there would be a European Common Market.

Chemical Production in Scotland

The list of chemical plants in Scotland, including addresses, main products and new projects in hand, that was published in the special Scottish issue of 'Chemical Age', 3 May, from p. 813 to p. 816, has been reprinted. Copies are available free on request to the Editor, 'Chemical Age', 154 Fleet Street, London EC4.

New Acetylene Plant for N. Ireland

AN acetylene gas producing plant is to be built in Northern Ireland for Carbide Industries Ltd. It is being built under licence from Shawnigan Chemical Co., of Canada by W. J. Fraser and Co. Ltd., Romford, and will provide acetylene to an adjacent factory under construction by Du Pont (Great Britain) Ltd. Frasers are also supplying a number of heat exchangers to Du Pont for their plant. Carbide Industries is a unit of the chemical division of British Oxygen Co. Ltd.

EXPANDING HORIZONS IN ORGANIC CHEMISTRY

Increasing Competition in Europe

ALTHOUGH during the past decade the UK organic chemical industry had made enormous strides and exports in 1957 reached nearly £500 million, it must not be overlooked that for a considerable part of this time competition in Europe was comparatively negligible. This was stated by Professor Sir Ian Heilbron, director of research, Brewing Industry Research Council, when he delivered the ninth Sir William Jackson Pope Memorial Lecture at the Royal Society of Arts last week.

Sir Ian pointed out that the picture was now changing and the growth of the chemical industry in Germany was expanding at a rate superior to that of the UK.

There was also the great unknown factor of Russia with its vast reservoir of trained scientists and technologists. If the European Common Market and the proposed Free Trade Area became effective, challenge would have to be met, which would certainly strain this country to the utmost.

'We need now more than ever before enlightened and bold leadership, both on the part of the Government and industry and a realisation that only through science can Britain maintain her position among the great powers'. Today, the words of Sir William Pope uttered nearly 40 years ago ring out with renewed meaning:

'The coming struggle for scientific and industrial position, on the results of which must rest the whole intellectual, artistic and material future of our race, will call for longer, greater, more persistent and more intelligent effort than any which we have hitherto exerted'.

Before 1939

In order to appreciate why Pope had dealt in such strong terms, and why it was necessary to return to this subject today, Sir Ian examined the position of organic chemistry in the UK prior to the outbreak of the first world war and dealt with Sir William Perkin's contribution by his discovery of the first synthetic dye, mauveine.

At the date from which Sir Ian's own personal interest in chemistry stemmed, at the beginning of the present century, the fine chemicals industry was essentially in German hands.

There had been new and important British advances on the road to man-made fibres in the commercial production, by Courtaulds in 1908, of viscose based on wood pulp, and in 1909 the production of the first of the thermosetting resins—Bakelite—was another technological landmark. Despite these achievements, the outbreak of war in 1914 found this country in great danger as the neglect of the organic chemical industry was realised. The end of hostilities had found Britain with the nucleus of a sound organic chemical industry.

Sir Ian said he doubted whether this country could have maintained a fine chemical industry had not the British Dyestuffs Corporation, which had had its beginnings in the dyestuffs factory of Levinstein Ltd., in Manchester in 1864, been absorbed into the great group of heavy chemical companies which in 1926 amalgamated together to form Imperial Chemical Industries Ltd. In his opinion, without the far-sighted policy of expansion which ICI had adopted since their inception, the outbreak of the second world war could well have found the country again devoid of a synthetic chemical industry based on coal tar products.

Intimate and fruitful co-operation abroad where syntheses of vitamins and sex hormones had been achieved by close collaboration of universities and industrial pharmaceutical laboratories, had quickly led to methods of manufacture and even to the establishment of new and important industries in which we, as a nation, had failed to participate to any large extent, despite our achievements in academic research.

Nylon had been developed in 1935 in the US and earlier, in 1932, the first US synthetic rubber, neoprene. An analogous achievement was Buna rubbers in Germany. But neither the US nor Britain had shown much interest in these discoveries at that time.

Wartime Developments

The outbreak of the Second World War had found this country generally in a satisfactory position to meet its immediate military requirements, but it had quickly become apparent that new factories would be required to cope with the growing needs of total war. Japan's victory in the Far East had closed all sources of natural rubber and a synthetic rubber industry had to be established by the Allies. The achievements in this field had brought into focus the vast potentialities of petroleum as a raw material for chemical manufacture. Today synthetic rubbers had secured a permanent place in our peace-time economy. In Great Britain domestic production of synthetic rubbers based on petroleum had now been started, and it was planned to make up to 75,000 tons a year. Other European countries, such as Germany, Italy, France, Holland and Spain, were also planning production up to some 200,000 tons a year of latex and rubber. Synthetic plastics, also based on petroleum, had now become an 'immensely important factor in world economics'.

All this represented only one facet in the field of 'chemicals from oil', said Sir Ian. In the US this field had been constantly expanding over the past 20 years and production in 1957 reached the 'astonishing' total of 38 billion lb. or 26 per cent of all organic chemicals made while it was estimated that by 1965 the output would be more than doubled. Already in this country the yearly output of petrochemicals was over 250,000 tons, or about one-third of our total production of organic chemicals.

Nowhere had the advance been more conspicuous than in the fields of medicine and agriculture during the present century. From the development of sulphanilamide in 1935 had resulted a wide range of chemotherapeutic agents. The Second World War had focused attention upon the possibility of finding other chemotherapeutics more powerful but less toxic than the sulphonamides. Penicillin was the antibiotic which had been discovered to be followed by a large range of other antibiotics. Within two decades production of antibiotics had attained a scale which would have seemed quite impossible to the microbiologist as recently as 1939. Spectacular progress had been made from 1940 onwards in other pharmaceutical fields, notably malaria, arthritis, hypertension, and tropical diseases, etc.

Hand in hand with these developments had been the increasing number of insecticides, pesticides and herbicides which had had a pronounced influence on the global production of foodstuffs.

In this lecture, Sir Ian said he had tried to emphasise the truly remarkable aptitude and fertility of mind which the organic chemist had manifested in satisfying all demands made upon him. He pointed out, however, that of predominant concern, had been the utilisation of nature's stored-up wealth, but it was now certain that already the scientist was placing at man's disposal other sources of energy which would open up an entirely new vista of wealth and opportunity as for instance, through Calder Hall and Zeta.

Corrosion Problems Studied by Research Association

SELECTIVE loss by corrosion of one constituent from a metallic alloy is being studied by the British Non-ferrous Metals Research Association says the annual report for 1957. Losses in the case of alpha copper-zinc can be prevented by suitable modifications in composition. However, in the case of alpha-beta brasses, a substantial effort in the past year or two has failed to find a means of inhibiting this corrosion.

During the past year it has been shown that exposure of various electro-deposited coatings on steel, in particular to atmospheres containing moisture and sulphur dioxide, gives a rapid and good indication of the performance of the coating in aggressive industrial atmospheres.

The association has developed a thermoelectric gauge to measure plating thicknesses. The thickness of single coatings is found by applying a heated probe to the surface and measuring the thermoelectric potentials developed. In some cases the method can be extended to cases where the plating consists of two different metal coatings, one over the other.

A survey of the problem of the recovery of useful effluents from electroplating processes has been carried out. The report which has been prepared includes an up-to-date appraisal of the use of ion exchange resins for this purpose.

NEW ADVANCES SHOULD SPEED H-POWER PROGRAMME

A SPECIAL announcement by the UK Atomic Energy Authority indicates that Britain has made a further important step forward in the harnessing of thermonuclear power for industrial use.

Results achieved from the experiments, according to Dr. B. F. J. Schonland, director of the AEA Research Establishment, Harwell, should enable the UK to make faster and more confident progress towards the building of practical thermonuclear power stations. To carry out the necessary research a special department—the CTR or Controlled Thermonuclear Reactor department—has been set up under Dr. Peter Thonemann. The budget given to this department, while not a 'blank cheque', was stated by Dr. Schonland to be more than adequate.

Further alterations are being made in ZETA which are expected to greatly increase its performance over that already planned. A new and far more powerful machine is being designed. Also under investigation for possible future development are a number of entirely novel approaches towards the harnessing of H-power. It is understood that these methods include some which are not being investigated anywhere else in the world.

The immediate project for ZETA is to increase the temperatures achieved inside it to 10 million degrees C as against the 5 million degrees C already achieved. The alterations are expected to be complete by the end of the summer. Other alterations which are planned will enable the power to be increased to a far greater extent and will allow the reaction inside ZETA to continue for one-tenth of a second as against one-three-thousandth of a second as is the case at present. The input of electrical power will also be increased five-fold.

The significance of this lies in the fact that even today the reactions taking place inside ZETA last several hundred times longer than the longest reaction occurring inside the most efficient US machine. The temperatures to be achieved in the modified ZETA should exceed 30 million degrees C, and may in fact prove to be very much greater.

Results of these new experiments, which will be published in detail in *Nature* in two or three weeks' time, show that a new and unexpected mechanism which is not yet fully understood has been operating inside ZETA. This mechanism is causing hydrogen atoms to fuse in a way that was not expected. In effect, it is reported, many of the neutron atomic particles thought to be produced by thermonuclear reactions set up inside ZETA were not in fact caused by the occurrence of hydrogen atoms. But it was confirmed in the special announcement by UK AEA that a number of neutrons were produced by fusion reactions by means of happenings which can, Dr. Thonemann and Dr. Schonland consider, help the UK to speed up its progress towards the development of thermonuclear power.

It appears that hydrogen atoms are fusing together as a result of the formation of a beam of very fast-moving deuterons which collide and fuse with other hydrogen atoms to produce neutrons. It was believed previously (see CHEMICAL AGE, 1 February, p. 227) that the fusing of these hydrogen atom cores was to a very large extent occurring as a result of random collisions of the atoms in the hydrogen 'soup' inside the reactor.

Heat Exchanger Goes by Sea from Thornaby-on-Tees to Bradwell

THE FIRST of 12 heat exchangers to be built by Head Wrightson and Co. Ltd. for the nuclear power station at Bradwell, Essex, has been sent by sea from the works at Thornaby-on-Tees, Yorkshire, to Essex.

At the launching ceremony, held on 16 May, Sir John Wrightson, vice-chairman and managing director of Head Wrightson, said that sea transport was decided on because of the size of the heat exchangers. If taken by road, he said, they would block the road network of eastern England for many months.

Describing the heat exchangers as the biggest job of its kind, Sir John said that they would produce 2½ times as much steam as those at Calder Hall. He claimed that they should give trouble-free service for the life of the station.

Each of the 12 heat exchangers is a vertical pressure vessel of 1 9/16 in. plate 19 ft. diameter over the major portion of its length, with a 20 ft. diameter section at the base. The overall height of each shell is 92 ft. 4½ ins. and the weight 200 tons. A corrosion allowance on the plate thickness has been included.

Bradwell power station is being built by the Nuclear Power Plant Co. Ltd., Knutsford, Cheshire, who were responsible for the basic design. This station is being built for the Central Electricity Authority. The detailed design of the heat exchangers was done by Head Wrightson and Co. Ltd., in collaboration with Clarke Chapman and Co. Ltd., another member of the Nuclear Power Plant Co. Ltd.

Corrosion Convention Proceedings

Proceedings of the Corrosion Convention held in London last October are available from the organisers, *Corrosion Technology*, Leonard Hill House, London NW1, price 21s, post free.

Demand for Molasses in Alcohol Fermentation Falls

THE warning given by Mr. G. W. Scott, chairman and managing director of the United Molasses Company in his annual report for 1956, when he forecast that molasses prices, which stood at extremely high levels at the end of 1956, must inevitably react to a falling demand, both in the US and Great Britain, has proved to be only too correct.

Presenting his report for 1957, Mr. Scott says that demand for molasses for alcohol fermentation and the manufacture of solvents was adversely affected by increased synthetic capacity which came into full production in 1957, coupled with the high price of molasses. Deliveries of molasses by the company during 1957 were at the lowest level since the war.

In these circumstances, reports Mr. Scott, it was inevitable that the selling price of molasses should react to the falling demand. The United Molasses Co. entered 1958 with stocks reduced to current levels. However, as a result of more competitive prices, deliveries for cattle feed have risen. He doubts whether there will be any material increase in the use of molasses for fermentation, due to the number of synthetic plants now in production.

Measurement of Film Thickness

A PNEUMATIC instrument for measuring the thickness of films and thin coatings was shown at the Royal Society's Conversazione held on 15 May. Developed by Dr. J. C. Evans and Mr. I. G. Morgan of the Metrology division, National Physical Laboratory, it is claimed to give an accuracy of 10 microinches.

Thickness is measured by placing the sample between jets which are supplied with air simultaneously from a source maintained at five lb. per sq. in. above ambient pressure. Air escape from the jets is restricted by the film and the pressure builds up. It is arranged that this pressure is proportional to the film thickness.

Another exhibit demonstrated the impregnation of timber by copper preservatives. The workers, Mr. D. S. Belford, Mr. C. D. Cook, Dr. A. Myers, Mr. E. H. Nevard and Professor R. D. Preston, of the department of botany, University of Leeds, were working with Tanalith C made by Hickson's Timber Impregnation Co. (GB) Ltd., Castleford, Yorks.

It was shown that the preserving compound is deposited within the solid material of the cell wall.

Will

DR. GEORGE FRANCIS NEW, O.B.E., former general manager of the Fertiliser Manufacturers' Association, former secretary of the Superphosphate Manufacturers' Association, the International Superphosphate Manufacturers' Association, and of the Fertiliser Society, left £13,566 net.

PROBLEMS OF SOVIET PLASTICS INDUSTRY DISCUSSED

THE fortieth anniversary of the 'October Revolution' has brought forth a number of reviews and assessments of the present position of various branches of industry in the USSR. Among these is an article on the problems facing the future development of the plastics industry. (M. I. Gabar, *Khim. Prom.*, 1957, No. 7, 397–402).

In the table below Gabar gives an indication of the rate of growth of this industry in relation to industry as a whole and to the chemical industry:

Indices of Industrial Production in the USSR from 1940–1956 (1940=100).

	1950	1955	1956
All industries	173	320	350
Chemical industry	183	416	468
Plastics industry	300	738	855

In spite of this rapid growth it is stated that the output of plastics is still far from adequate for the needs of the national economy. In addition an increase in variety and improvements in quality are required.

After a brief account of modern developments in high-polymer science now available to the industrial technologist, such as methods of block and graft polymerisation, the discovery of stereospecific, heterogenous catalysis, etc., the raw material basis of the industry is considered. While mentioning the by-products of the coke, shale, peat, wood and agricultural industries, greatest emphasis is placed on the contribution of the petroleum industry. Fifteen points are given, whereby greater use might be made of petroleum products for the plastics industry. Among these are; introduction of industrial methods of producing olefines (ethylene, butadiene, etc.) from petroleum hydrocarbons; production of ethylene and acetylene by introducing the hydrocarbons into a stream of oxygen and hydrogen fed through a burner jet; introduction of 'platforming' (platinum re-forming of cracking gases) to yield benzene, toluene, etc., and hence phenol, caprolactam, styrene, terephthalic acid, etc.; introduction of the oxo-synthesis process for higher alcohols; direct oxidation of saturated hydrocarbons to formaldehyde, acetaldehyde, acetic acid, etc.

The importance of natural petroleum gases is particularly stressed, and it is urged that these should be collected and separated as raw material sources of ethylene, etc. There should be no competition between natural and cracking gases, the former acting as a large additional source of raw materials at lower cost. The capital outlay involved in isolating the natural gases is much less than that involved in the multi-stage cracking processes.

It is stated that all future projects for petroleum processing will be in the nature of petrochemical combines, producing a large variety of organic raw materials and high-polymeric products. The value of the petroleum hydrocarbons will thereby be greatly increased in comparison with their value as fuels.

An account is given of the activities and scope of a number of research institutions connected with the industry and it is concluded that there is a sufficient number of specialists to meet present needs, the main problem being to attract enough of these towards creative research work.

The article concludes with a list of 21 specific problems which it is suggested should receive immediate attention. These include; production of block and graft copolymers based on phenol-formaldehyde resins, rubbers, p.v.c., etc.; research on new catalysts for condensation and addition polymerisation; initiation of polymerisation by nuclear radiations; the use of ultrasonic methods of investigating the mechanical properties of polymers and for separation, polymerisation, degradation and emulsification; synthesis of inorganic polymers of high heat-resistance.

Some New Polyethylenes by Phillips

SOME new members of Phillips Chemical's Marlex polyethylene family are reported in the US. One of the new polymers is being produced on a commercial scale at the company's Pasadena, Texas, plant and a second is in semi-works production and is to be available from the commercial plant shortly.

The polymers are reported to have a very much higher resistance to thermal and environmental stress cracking and a greatly improved long-term load-carrying ability. The new series is expected to expand potential markets in monofilaments, wire-coating, bottles and containers and injection moulded products.

Results of investigations by Phillips Chemical show that a filament made of one of the new polymers supports a load of 20,000 lb. p.s.i. for 2,000 hours before breaking. Under these conditions previously produced rigid polyethylene filament failed at between 50 and 500 hours. Under severe conditions, resistance to stress cracking has been observed. The new materials are claimed to process more easily than other polyethylene wire and cable grade resins, thus making them highly suitable for wire and cable coatings. The polymer recommended for this purpose will also prove good material for bottles, state Phillips Chemical.

An improvement of at least 30 per cent is claimed in plastic flow under injection moulding. The polymers are being considered, therefore, for use in thin-wall containers and large moulded items. Compared with Marlex 50 the new polymers have lower density and modulus. The two polymers available, i.e. the one in commercial production and the semi-works scale product, are obtainable in a number of melt index types.

UK Plastics Sales Up 17 Per Cent in 1957

TOTAL sales of plastics materials in the UK in 1957 were 393,100 tons, an increase of 17 per cent over 1956. Exports were 106,000 tons in 1957, which was an increase of 14 per cent on 1956.

Sales increases were mainly in thermoplastic materials, which were 27 per cent up on 1956. Sales of thermosetting materials were 5 per cent more than in 1956. Casein sales continued to drop.

NET SALES FOR 1956 AND 1957 IN THOUSAND TONS

Material	1956	1957
Thermosetting materials		
(1) *Alkyds:*		
Solid & liquid resins	30.6	33.7
Solutions, emulsions & dispersions (net resin content)	8.6	9.4
Other	0.3	0.4
Total alkyds	39.6	43.5
(2) *Aminoplastics:*		
Solid and liquid resins, including solutions (net resin content)	28.4	28.5
Moulding and extrusion compounds	20.5	22.0
Total aminoplastics	48.9	50.5
(3) *Casein plastics:*		
Sheet, rod, tube & profile shapes	2.7	1.7
(4) *Phenolics & cresylics:*		
Straight solid & liquid resins	11.4	10.8
Modified solid & liquid resins	5.8	5.9
Solutions, emulsions & dispersions (net resin content)	2.2	3.1
Moulding & extrusion compounds	25.9	26.4
Decorative laminated sheet	7.7	8.1
Other laminated sheet	8.3	9.2
Cast sheet, & laminated or cast rod, tube & profile shapes	3.2	3.2
Total phenolics & cresylics	64.6	66.7
(5) *Polyesters*	2.2	3.2
(6) Other thermosetting materials	3.5	4.7
Total thermosetting materials	161.4	170.2
Thermoplastic materials		
(7) *Cellulose plastics:*		
Moulding & extrusion compounds	6.2	6.8
Other (including photographic film base)	5.2	5.5
Total cellulose plastics	11.4	12.3
(8) *Polyvinyl chloride:*		
Solutions, emulsions & dispersions (net resin content)	1.2	1.8
Moulding & extrusion compounds	26.8	35.6
Plasticised sheet	16.0	25.0
Unplasticised sheet	2.2	1.9
Rod, tube & profile shapes	1.0	2.0
Total polyvinyl chloride	47.2	66.2
(9) *Polystyrene:*		
Moulding & extrusion compounds	22.9	28.9
Other	1.0	2.2
Total polystyrene	23.9	31.1
(10) *Polyvinyl acetate*	11.0	12.5
(11) *Other thermoplastic materials* (including acrylics, polyamides, polytetrafluorethylene, polyethylene & polyvinyl chloride resins (i.e. Polymer sold as such)	82.8	100.9
Total thermoplastic materials	176.2	223.0
Total all plastics materials	337.6	393.1

Reactor School Course

A course on the control and instrumentation of reactors is to be held at the Harwell Reactor School from 6 to 11 October, 1958. The fee for the course will be 25 guineas exclusive of accommodation. Further details can be had from The Principal, Reactor School, AERE, Harwell, Berkshire.

M AND B WORKERS DESCRIBE SUBLIMINATION APPARATUS

BECAUSE they have noted in the literature descriptions of much more elaborate devices which offer no corresponding advantages, May and Baker workers have published in the May issue of the *M and B Laboratory Bulletin* details of a simple sublimination apparatus.

The apparatus comprises a single 6 in. by 1 in. Pyrex tube closed by a rubber bung through which passes a short piece of 6 mm. glass tubing to which is fixed rubber pressure tubing leading to a vacuum pump. The glass tube is heated by means of a copper or brass block which is bored so that the tube is a snug fit and enters the block to an extent of about 2-2½ in. Another hole carries a thermometer.

The block is supported by a rod in a boss on an ordinary retort stand and is heated either by a gas flame or by suitable electrical elements wound round it.

A funnel is used to charge the tube with crude material to be sublimed. This directs the material to the bottom to avoid contaminating the upper wall of the tube where the sublimate is to form. A light pad of asbestos or glass wool is then gently tamped on the top of the charge. The bung is inserted and the tube evacuated cautiously. If the substance is a fine powder, it is tapped lightly, as the vacuum is applied, in order to release trapped air.

The block is then adjusted to incline the tube to an angle of about 15° from the horizontal and the tube inserted.

The temperature is raised steadily until the sublimate begins to form at a reasonable rate. The best operating temperature is a matter for judgement based on experience and is only critical if the substance is not very stable to heat. If a mixture is being sublimed, the sublimate may well show well-marked zones and it is possible to achieve good separations by making use of this.

It is desirable to remove the crystalline form of the sublimate at intervals. Substantial quantities (50 g. or more) can be put through in a day under favourable conditions. The operation can be scaled down, a 6-7 mm. bore tube being convenient for semi-micro (10-50 mg.) scale and a melting point capillary for micro scale. Separate heating blocks of appropriate sizes are preferred to one block with multiple holes of varying sizes.

This apparatus can be used for short-path evaporative distillation. For this a small bulb or cup is blown in the tube ½-1 in. outside the block to collect liquid or low-melting solids. Cooling can be applied to regions of the tube by a loop of filter paper on to which ice water is dripped.

The merit of the apparatus lies in its simplicity and the fact that it provides an opportunity for a little manipulative skill in achieving elegant results.

New Type Liquid Detergent

Interesting properties are claimed by Cyclo Chemicals Ltd., Manfield House, Strand, WC2, for a new type of liquid detergent, Cycloryl Na which is the sodium salt of a sulphated, ethoxylated lauryl alcohol. Its formula is: C_{12} H_{25} $(OCH_2$ $CH_2)x$ OSO_3 Na. .

This new detergent is described as having excellent foaming properties, simple viscosity control, resistance to hard water, marked cleansing power, superior rinsibility, high tolerance to electrolytes, stability over a wide range of pH, non-corrosive to resin-lined aerosol containers, no skin formation on storage and requires no preservatives. The manufacturers recommend it as an ideal base for shampoos and industrial detergents.

Physically, this detergent is an almost colourless and odourless clear liquid with the following specification: Active matter 30 per cent approximately; cloud point below 0° C; pH 6.5 to 7.0; and viscosity at 20° C 10,000 centipoises.

The viscosity of Cycloryl Na can be adjusted with ease, it is claimed. On dilution with water the viscosity decreases but high viscosity (even to a jelly-like state) may be obtained by adding small quantities of sodium chloride or sodium sulphate to the diluted material.

To reduce viscosity without reducing concentration of the detergent, xylene sulphonic acid and p-toluene sulphonic acid and their sodium salts have been found to be most effective. A small quantity (up to 1 per cent) can reduce the viscosity from a hardly mobile gel-like state to something approaching the viscosity of water.

For shampoo formulations Cycloryl Na can be used with mono and di-alkylolamides and superfatting agents. It is also compatible with a wide range of anionic and non-ionic compounds.

Supplies are available ex-stock, packed in lacquer-lined wooden kegs containing 1 cwt, and in aluminium drums containing about 4 cwt.

Free working samples are available on request and the facilities of the company's research laboratories are placed at the disposal of clients for technical enquiries.

Crop Protection Chemicals List Available

The approved list for 1958 of crop protection products has been published by the Ministry of Agriculture, Fisheries and Food. Copies may be obtained free from the Ministry at Soho Square, London W1, the Department of Agriculture for Scotland, St. Andrew's House, Edinburgh 1, or any of its area offices, and the Colleges of Agriculture at Aberdeen, Edinburgh and Glasgow.

Letter to the Editor

Anhydrous Hydrazine

SIR,

In the Royal Institute of Chemistry 'Monograph on Hydrazine' (No. 5 of 1957), various methods of obtaining anhydrous hydrazine from its hydrate are described; one of them, the distillation with caustic soda can be dangerous and can cause explosions and this hazard is referred to by the author.

It does not seem to be generally known that fractionation of hydrazine hydrate, using high efficiency columns and adequate reflux ratios, can give 99 per cent hydrazine $NH_2.NH_2$ in high overall yields in one pass and that the aqueous residues can be used for preparation of a solid hydrazide from which hydrazine hydrate can be regenerated quantitatively for re-cycling.

Using a packed column of 2 inch diameter, filled with ¼ inch ceramic Raschig rings, and equivalent to about 25 plates, with reflux ratio of 12 to 1, a one pass yield of about 75 per cent of hydrazine can be recovered as 99 per cent hydrazine.

Hydrazine boils at 113–114°C and is said (1) to form an azeotrope with water containing 28 per cent of the latter; the hydrate $NH_2.NH_2.H_2O$ contains 36 per cent of water and our experience is that this hydrate is in fact the 'azeotrope' to which this refers. It boils at 120°C and the fractionation hence gives water in the first runs, anhydrous hydrazine later and terminates with the hydrate. The fore-runs can be rejected and the later runs containing hydrate can be converted into solid hydrazides as stated. Experiments using 3 component mixtures of hydrazine, water and a third material are in progress.

Yours, etc.,

M. A. Phillips (Dr.)

14 Western Road,
Romford, Essex.

REFERENCE

(1) Azeotropic data (Horsley *et al.*) A.C.S. series, p.6.

ASCW's Call for Substantial Pay Rises

AT their annual conference in London on Saturday last, the Association of Scientific Workers made a call for 'substantial salary increases for scientific workers at all levels'. The general secretary, Mr. John Dutton, said that salaries at the age of 35, for the three main grades, should be: senior officer £2,000, executive officer £1,500, and scientific assistant £1,000.

The resolution on pay stated that it was 'essential that the salaries of scientific and technical staff should be raised to the level that will attract and retain the best brains, and prevent the outflow from scientific employment and loss by emigration'.

Another resolution approved by the conference was that condemning 'the inadequacy of current Government policy in schools, universities and technical colleges in failing to expand the supply of scientific and technical manpower to the necessary extent to secure Great Britain's economic future in those fields'.

NEW WATER-SOLUBLE RESIN FROM TAR ACIDS

Method Does Not Call for Pure Phenols

NEW pilot plant projects have been sanctioned by the governing body of the Indian Council of Scientific and Industrial Research which met in New Delhi on 22 March 1958. They include manufacture of enzyme bates, tannin extracts; production of sodium sulphate at Sambhar; and utilisation of cation exchange resin from cashew nut shell at the National Chemical Laboratory, Poona. A method of preparing resins from commercial cashew nut shell liquid, which is indigenously available in large quantities, has been worked out in the laboratory. The method consists of condensing the shell liquid and sulphonating the resulting polymer.

Thermosetting resin from tar acids. A water-soluble thermosetting type of resin has been prepared from tar acids without the use of pure phenols as a result of investigations carried out at the Central Fuel Research Institute, Jealgora (Bihar). The method developed (Indian Pat. 56581) does not involve the use of pure phenols normally required for preparing phenol-formaldehyde resins. In addition, the soluble thermosetting resin produced can be impregnated on different fillers without the use of an organic solvent.

Recovery of Tar Acids

The tar acids are recovered by extracting the distilled tar fractions with alkali. The crude alkali extracts are condensed with formaldehyde under controlled conditions to produce a water soluble resin. The alkali acts both as a catalyst for resinification and as a reagent for imparting water solubility. This step substantially reduces the cost by obviating the need for liberating the tar acids from alkali extract and also saves the cost of alkali in the resinification process.

For impregnation in various fillers, the resin is precipitated by controlling the pH of the solution. This method of impregnation (Indian Pat. 56582) keeps the material free from any acid or alkali and results in better impregnation of the resin on the surface and in the interstices of the fillers which makes for better bond strength to the finished material.

Pentachlorophenol. Laboratory and pilot scale investigations undertaken at the Forest Research Institute, Dehra Dun, have resulted in the development of a method for the production of pentachlorophenol by a single stage process. The chemical is not manufactured in India and the country's entire requirements are at present imported.

The process consists of the chlorination of phenol at 30-32°C using carbon tetrachloride as solvent and anhydrous ferric chloride as catalyst. Exposure to a 60w electric lamp hastens the reaction. Yield of crude pentachlorophenol was maximum (86 per cent) when seven per cent of anhydrous ferric chloride on the weight of phenol was used.

Sodium chloride AR and BP from marine salt. The Central Salt Research Institute, Bhavnagar (Saurashtra) has developed a process for refining marine salt to AR and BP grades. The bulk of soluble impurities, present in marine salt, are removed by washing. A saturated solution of the washed salt is then prepared and treated with calcium oxide and sodium carbonate to remove the residual impurities. Fractional crystallisation from purified solution yields salt of the required grade. Yield of AR salt is 33 per cent.

INDIAN NEWSLETTER

- **Thermosetting resin produced from tar acids.**
- **Pentachlorophenol produced by single stage process.**
- **Electrolytic preparation of perchlorates.**
- **Tata Fisons Ltd. now in operation.**
- **Licences granted to companies for chemicals production.**

Electrolytic preparation of perchlorates. Investigations have been carried out at the Central Electrochemical Research Institute, Karaikudi, for designing a large-scale unit for the production of ammonium and potassium perchlorates. Optimum working conditions have been formulated and a 2 litre cell capable of producing 3 lb. of potassium perchlorate per batch has been fabricated at the institute. Current efficiencies of the order of 96 per cent have been achieved in an experimental cell (7.5 x 4.0 x 7.0 cm.). The current efficiency dropped to 85 per cent when a larger cell (16 x 10 x 16 cm.) was employed.

Plants for soda ash and copper oxychloride. During 1957 Tata Chemicals Ltd. made substantial progress with the scheme for modernisation and modification of existing plant. Soda ash plant capacity has been raised to 400 tons per day by making substantial additions to the existing plant. The design and development work, completed recently, was carried out by the development and process control department of the company at Mithapur.

Among the new lines taken up by the company during the year is the production of a wide range of pesticides, fungicides and insecticides in association with Fisons Ltd. A new company, Tata Fisons Ltd., was incorporated for this purpose in June 1957, and went into operation recently. Two formulating units have been set up in Bombay and Cochin. Benzene hexachloride and ethylene dibromide required for the plants are being supplied by the Mithapur works.

Tata Chemicals designed and fabricated a plant during the year for production of copper oxychloride, a fungicide used in coffee, tea and rubber plantations. The material has hitherto been imported; during 1957, imports of copper oxychloride were estimated to be about 650 tons, valued at over Rs.2.15 million. The consumption is expected to increase considerably as the beneficial effects of the products become better known.

The new plant has a capacity of 500 tons per annum which is sufficient to meet the entire estimated requirements of the country.

Durgapur coke ovens. The construction of coke ovens and gas plants at Durgapur under the Durgapur Industries Board, Government of West Bengal, is proceeding satisfactorily. The plants, scheduled to go into production by the end of 1958, include a coke oven plant with a daily throughput of 1,300 tons of coal and coal breeze, auxiliary plants for the recovery of by-products from coke oven gas; coal tar distillation plant with a daily input of 50 tons coal tar and a sulphuric acid plant of 9.5 tons per day capacity.

Sindri superphosphate factory. The Bihar Government's superphosphate factory at Sindri, estimated to cost Rs.6 million (£450,000) is expected to go into full production shortly. The sulphuric acid plant of the factory, having a capacity of 15 tons per day, has already started trial runs.

New Contact Plant

DCM design sulphuric acid plant. The DCM Chemical Works, Delhi, have designed and fabricated a 75-ton contact plant. This is the first plant of this size, equipped with a waste heat boiler, designed and fabricated in the country. Except for certain essential parts imported from the US, Germany, Belgium and other countries, almost the entire equipment has been procured from within the country.

DCM Chemicals, started in 1942 with a production of two tons per day of chamber sulphuric acid, have grown into one of the largest heavy chemical manufacturing units in the country. The factory has a daily installed capacity of 28 tons (which is being raised to 50 tons) caustic soda, 75 tons hydrogenated fat and 75 tons sulphuric acid.

Rayon grade caustic soda. The Calico Mills Chemical Division's new alkali plant in Chambur (Bombay) designed to produce 6.4 tons of rayon grade caustic soda a day by the electrolytic process went into production during March. The plant, equipped with Kreb's mercury cells, will also produce p.v.c. by utilising the by-product chlorine. Full capacity is expected to be reached shortly.

New licences. Licences under the

Industries (Development and Regulation) Act have been granted to a number of firms for erection of new capacity for sulphuric acid, caustic soda, power alcohol, carbon disulphide, dyestuffs, and drugs and pharmaceuticals. Four plants to be erected in the States of Bombay, Andhra, Madhya Pradesh and Punjab will have a total capacity of over 260,000 gal. of power alcohol a month.

A new plant to be set up in Kanpur (UP) will have a capacity of 8,250 tons of carbon disulphide. Another plant in Bombay will set up new capacity for 1,785 tons a year of the same chemical.

Phased production of substantial quantities of vitamins is to be undertaken by Glaxo Laboratories, Bombay, as under: *Phase I:* Vitamin A, 1 million mega units per year starting from imported retinene quinolate; cortisone type compounds, 60 kg. per year. *Phase II:* Vitamin A, 10 million mega units per year from imported retinene quinolate; β-ionone, 12 tons per year from lemon grass oil; cortisone type compounds, 120 kg. per annum. *Phase III:* Vitamin A, 10 million mega units from lemon grass oil; cortisone type compounds, 120 kg. per annum.

Tariff protection for stearic and oleic acids. The Indian Tariff Commission has recommended that protection to the stearic acid and oleic acid industry should be continued for a period of two years, that is, till 31 December, 1959, at the existing rate of duty, *viz.* 35 per cent *ad valorem* or 50 nP (9d) per lb. whichever is higher. The Government have accepted the recommendation.

Ministry Work May Lead to Non-explosive Liquid Acetylene

THE close contact of the British Acetylene Association with the Home Office was stressed by Sir Charles C. Cunningham, HM Permanent Under Secretary of State, Home Office, when he proposed the toast of the association at the annual luncheon held in London on 15 May. His short period of office had brought home to him, said Sir Charles, the association's variety of work, such as in the presentation of standards through British Standards Institute on arbitration testing of carbide, etc. The association was alive to possibilities and in the highly complex and competitive world of today alive to making use of these. Recent developments in the industry had shown this.

Sir Charles mentioned the Government's interest in Northern Ireland with regard to carbide; spraying of tungsten carbide on tools. They were also interested in solid and liquid acetylene at the Ministry of Supply at Woolwich, which might lead to production of acetylene in liquid form which was non-explosive.

The President of the BAA, Mr. E. Seymour-Semper, replied to Sir Charles. He said the association was pleased to have among their guests, Mr. Burgess, Assistant Secretary, Board of Trade, Capt. N. Fawcett, HM Chief Inspector of Explosives, Home Office, and his deputy, Capt. C. W. Ede, Dr. J. S. Carter, the Chief Inspector Alkali Works, and Mr. Newbury, Chief Officer of Public Control, LCC. Mr. Seymour-Semper also referred to the election next year of Mr. John Strong (British Oxygen Co.) as President of the Institute of Welding. Mr. Strong is at present the vice-president.

The president said that the BAA was very pleased to have three sons of founder-members of the association, who were connected with the industry, at the luncheon. The three gentlemen in question were Mr. Albert Hoddle and his brother, Mr. C. F. Hoddle, of Thorn and Hoddle Ltd., and Mr. P. Pettypierre.

The report of the council of the BAA for the year ended 31 December 1957, indicates that legal opinion has been taken with regard to the registration of the association under the Restrictive Trade Practices Act, 1956, largely due to the association's regulations regarding generators and ancillary apparatus, etc., and partly due to their adoption of the BSS for calcium carbide.

It is reported that the Technical Sub-Committee on Sampling and Testing of Calcium Carbide have carried out a great deal of work during the past session, and it is expected that they will shortly be in a position to put their findings in the form of a report that can be placed before various Continental manufacturers and consumers with a view to obtaining their comments prior to an approach to British Standards Institution *re* the amendment of the present Standard. The general feeling of the Regulations Committee is that two standards will be necessary—one for sampling and testing and the other for quality.

Work is still continuing by La Commission Permanente Internationale de l'Acetylene (CPI) on the revision of the ILO Handbook on Safety and Protection in the use of Acetylene and on such questions as: Suppression and collection of fumes from carbide furnaces; international transport of dangerous goods; causes of ignition during handling of calcium carbide; draft regulations for dissolved acetylene cylinders; and flame-proof devices in atmospheres containing acetylene.

In 1961, the association celebrates its Diamond Jubilee and it has been agreed that CPI will hold their summer meetings in that year in this country combined with the association's own jubilee celebrations.

Technical Authorship Courses by City and Guilds

A scheme of courses and examinations in technical authorship has been drawn up by the City and Guilds of London Institute, Gresham College, Basinghall Street, London EC2. The course will involve four years of part-time attendance of at least five hours a week and 150 hours a session, making a total of 600 hours for the course.

New Polar Synthetic Rubber Latex

A NEW polar synthetic rubber latex, Politone K.745, developed at the Dunlop Research Centre, is an oil resistant copolymer containing butadiene, and possessing properties similar to a butadiene-acrylonitrile copolymer of medium acrylonitrile content. The new product should be of use in those applications where oil resistance and heat ageing are important requirements.

In the rubber and plastics industry it has been successfully tested in the dipping of oil resistant goods such as protective gloves and insulating sleeves. It has been supplied to latex compounders for use as a raw material in the preparation of their compounds, and to adhesive manufacturers for laminating compounds. It is also being tested for adhesive tape barrier coatings and p.v.c. tape primers.

In the textile industry the abrasion resistance of rayon, gaberdine, and cotton can be considerably improved by the application of Politone. It can also be used as the binding agent in non-woven fabrics where oil-resistant qualities are required.

The incorporation of Politone in paper enhances its wet strength edge, tear strength, elongation and flexibility. Paper treated with it is suitable for the manufacture of gaskets, baling papers, artificial leather, boxes and corrugated paper. It can also be used as a wallpaper coating. Moreover, by virtue of its chemical structure, it adheres tenaciously to leather surfaces and may be used as a leather finishing agent.

Although Politone has been specially developed for applications where resistance to solvents, oils and greases is required, it should not be used with certain non-paraffinic solvents such as trichlorethylene.

British Standard for Essential Oils

REQUIREMENTS for fifteen essential oils are specified in a new series of British Standards published in one volume (BS 2999/1 to 15 : 1958). It is the first group of British Standards for essential oils to be published by the BSI.

The first group comprises specifications for the following distilled oils:

Cananga	Parsley seed
Celery seed	Patchouli, East Indian
Cinnamon leaf, Ceylon	Patchouli, Seychelles and African
Cinnamon leaf, Seychelles	Pepper
Cubebs	Spanish sage
Lavandin	Spearmint
Japanese mint	Vetiver
Neroli	

The publication recognises that a specification for an essential oil in terms of chemical and physical constants cannot give a complete criterion of the quality of the oil, since properties incapable of being objectively measured (such as odour and flavour) must feature in its assessment. The hope is expressed, however, that the figures quoted, based, as they are, on the experience of those responsible for the standards, will serve a useful purpose as the basis upon which trade can be conducted.

Copies of this British Standard may be obtained from British Standards Institution, Sales Branch, 2 Park Street, London W1, price 7s 6d.

Overseas News

EDISON ITALIAN GROUP REPORT SATISFACTORY RESULTS FOR 1957

SATISFACTORY results are reported in the sectors of chemical industry in which the members of Edison Group are engaged. During 1957, Sicedison produced principally plastics materials based on polyvinyl chloride and polystyrol chloride, and solvents. Some of the departments of the company's factory at Porto Marghera have been expanded and others are being added.

Construction of the petrochemical factory in Mantua is well on its way. At this plant, derivatives of ethylene, monomeric styrol, and some types of detergents will be produced.

Sincat are getting their new plant at Priolo (Sicily) ready for operation. Their Santa Caterina Mine (near Caltanisseta) has already started production of raw potassic salts.

Societa' Celene have started the production of polyethylene and Acsa have initiated the production of acrylic synthetic fibres. Acsa has obtained licences from Chemstrand Corporation (Decatur, Alabama, US) which is supplying also some capital and technical assistance. Societa' Celene is affiliated (50 per cent) with the Union Carbide Corporation.

Freeport Sulphur to Sell Oil Properties

Freeport Sulphur of US will try to sell more than two-thirds of their oil and gas properties. Proceeds of the sale will be used to develop further their sulphur and nickel properties. It is estimated that the sale would realise about $75 million.

German Nitrogen Plant for Egypt

Badische Anilin und-Soda Fabrik, West Germany, are to build a 450,000-tons a year nitrogen plant in Egypt.

Barium Sulphate Plant Operating in Sardinia

Societa' Italdrila have started operating a new plant producing barium sulphate, in Sardinia. The new plant will utilise mineral found locally and the barium sulphate produced will be exported to North America and Middle East.

It is understood that it will be sold only to some affiliations of US petroleum companies drilling wells in these areas.

Second Japanese Synthetic Rubber Project

The Japanese Synthetic Rubber Co. has been authorised to proceed with further plans for synthetic rubber production in association with Japan Development Bank and other industrial associations. Among these are Mitsubishi Petrochemical Co., Bridgestone Tire Co., and Kyowa Kakko Co. Working capital is 625 million yen, (£625,000 approximately) which is later to be raised to 2,500 million yen (£2,500,000).

The synthetic rubber factory which is under construction at Yokkaichi will receive petrochemicals from Mitsubishi. Technical 'know-how' will be received from Houdry and Co., in collaboration with Goodyear Tyre and Rubber Co. The proposed capacity is 45,000 tons-a-year of GRS-type rubber.

11 Per Cent Rise in Czech Plastics Production

Production of plastics substances will increase in Czechoslovakia this year by 11 per cent on the average according to a recent report from Vienna. The chemical factories are to produce considerable quantities of p.v.c., phenoplastics, layered materials, bakelite-type resins and compressed substances. Spolek pro Chemcken a Hutni Vyrobu (Chemical and Metallurgical Production Group) in Ustri will extend the production of epoxide resins. Plastika National Enterprise in Prague will also produce four new kinds of polyester resins, glass-textile laminates, and will also increase production of silicones, plastic film, variegated polyamide pulp and acrylic sheeting.

By the end of the Second and the beginning of the Third Five Year Plan, large new plants for the production of polyethylene, polystyrene, varnishing resins and silicones are to be built. Production of these materials will thereby be doubled, it is stated.

W. Germany's Plastics Pipe Production

For some years now Western Germany has been producing plastics piping on a large scale, mainly from p.v.c. and polyethylene. In 1957 270 tons (metric) of piping was produced valued at DM 20 million, twice the quantity produced in the previous year.

Higher production, it is reported, has led to lower prime costs and lower sales prices and the value of finished pipe in 1957 was DM 7,400, a drop of 10 per cent of the value per ton of finished pipe.

New Process for Polymerisation

SA Polyplastic, 56 rue de Faubourg, St. Honoré, Paris, have announced a new graft polymerisation. It is based on the pretreatment of polymer with ozone. Vinyl-vinylidene and diene monomers can be grafted .

This surface graft polymerisation is intended primarily for treating finished products and has been used, for example, to condition polyacrylonitrile fibre and polypropylene and polyethylene products to accept all dyestuffs.

PVC Production in Japan

Because of their large stockpiles and a lower demand for p.v.c., Japanese manufacturers of p.v.c. have agreed to cut down monthly production from 9,000 to 7,000 metric tons. Since monthly capacity is 14,000 tons, capacity is only being half used.

Egypt's Pharmaceutical Plans

Egypt's five-year plan for industry includes new pharmaceutical manufacturing plants. An Egyptian-Russian credit agreement provides that installation of factories and the laboratories of the new concerns will be with the aid of Russian material and specialists.

The production programme announced includes: Salicylic acid, 10 tons a year; aspirin 90 tons; sodium salicylate 30 tons; methyl salicylate 6 tons; PAS 20 tons; sulphonamide 100 tons; chloramycetin 2.5 tons; streptomycin 4 tons; and blood plasma substitute 25 tons. Production is scheduled to begin at the end of 1959.

Sulphur Project in Poland

The Polish industrial planning authorities are to change their plans for the exploitation of the extensive deposits of sulphur discovered at Piaseczno in Rzesnow. These changes involve a speedier construction of the mining installation and a higher extraction rate. The Piaseczno mine is to yield 1,900,000 tons of ore annually instead of 750,000 tons originally foreseen and the total quantity of pure sulphur to be extracted from this ore will amount to 350,000 tons and not 150,000 tons.

Inauguration of work on a second sulphur ore mine situated at Machow has been postponed for two years so that more investments can be directed into work at the Piaseczno mine.

Stable Disulphinic Acids

Successful synthesis of the first stable crystalline aliphatic disulphinic acid has been reported in the US by American Cyanamid. The acid in question is 1, 4—butane disulphinic acid ($HO_2S - CH_2 CH_2 CH_2 CH_2 - SO_2H$).

American Cyanamid research indicates that it should be possible to make many new products from 1, 4—butane disulphinic acid, since the disulphinic acids are very reactive compounds. The activity of the 1, 4—butane acid is stated to be similar to that of acryl sulphinic acids. These are comparable to sodium bisulphite in ability to add to carbonyl and related nitrogen compounds, e.g., azomethines. Sulphinic acids are also stated to be reducible to thio alcohols and mercaptans.

This new acid is produced by reducing the corresponding disulphonyl chloride with sodium sulphite and is obtained direct from the reduction solution. It is recrystallised from water, m.pt 124° to 125° C, in 60 per cent yield. No change has been noted in the acid after seven

months' storage and only slight decomposition after 20 months'.

Experiments have been carried out to isolate the next higher and lower homologues. However, neither 1, 3—propane nor 1,5—pentane disulphinic acids have been isolated although zinc salts of these acids have been separated. Free 1, 5—pentane disulphinic was liberated from the zinc salt, but was found to be hygroscopic and has to be stored over P_2O_5. No liberation of 1, 3—propane disulphinic acid has yet been accomplished. Free 1, 6—hexane and 1, 10—decane sulphinic acids have been prepared but these have not proved as stable as 1, 4—butane disulphinic acid.

Texas Gulf and Freeport Form Sulphur Export Company

Texas Gulf Sulphur Co. and Freeport Sulphur Co. have formed a jointly owned subsidiary, Sulphur Export Corporation, to handle marketing of sulphur by the two concerns outside North America. Other sulphur producers are to be invited to join the venture. The two other chief US sulphur producers are Jefferson Lake Sulphur Co. and Duval Sulphur and Potash Corporation.

Exports of sulphur in 1957 by Freeport and Texas Gulf totalled about 900,000 tons, valued at approximately $24 million. Freeport mined about 2,200,000 tons of sulphur in 1957 while Texas Gulf mined about 2,840,000 tons.

Allied Chemical Set Up Canadian Firm

Allied Chemical Canada Ltd., a newly established Canadian corporation, will be responsible for the conduct and future development of a business backed by an investment in Canada of more than 50 million dollars. The Canadian company will be a subsidiary of Allied Chemical Corporation, New York.

With effect from 2 June Allied Chemical Canada Ltd. will be successor to the chemicals and related businesses of five long-established Canadian firms: Barrett Co. Ltd., Brunner Mond, Canada Ltd., National Aniline and Chemical Co. Ltd., the Nichols Chemical Co. Ltd., and Semet-Solvay Co. Ltd.

Finnish Nitrogen Plant Doubles Capacity

The Finnish State nitrogen factory, Typpi Oy, produced 29,832 tons of pure nitrogen in 1947, an increase of 13,000 tons over 1956. The increase is due to a doubling of the factory's capacity.

US Borax and Chemical's Decline in Profits

Net sales of the United States Borax and Chemical Corporation for the first quarter of this year amounted to $13.60 million ($14.17 million), bringing the total for the six months to 31 March 1958 to $25.34 million ($26.73 million). Net income, after tax, etc., was $743,309 ($2 million) for the quarter and $601,369 ($3.54 million) for six months, equivalent to 14 cents (44 cents) and 7 cents (77 cents) respectively.

Demand for boron products generally in both domestic and export markets is stated to be holding up quite well. Export sales of boron products, however, were lower in the first quarter of this year largely because output from the new plants at Boron, California, had not yet reached full capacity. Potash sales in January and February were down compared with those in the same months of 1957. March sales showed some improvement.

It is reported that a considerable increase in output from the new Boron plants was attained, although it failed to meet demand by a significant margin.

Courtelle Fibre may be Made in France

The French wholly-owned subsidiary of Courtaulds Ltd., Les Filés de Calais SA, is reported to have under consideration a project to manufacture the acrylic fibre, Courtelle, developed by the parent company. The fibre would be produced at the French company's viscose factory at Calais, where there is ample room for building expansion, and where provision for the necessary services already exists.

Mexican Sulphur Developments

The Washington Export-Import Bank has just announced that the assets of the Cia. Azufrera Mexicana SA, the Mexican operating subsidiary of the Mexican Gulf Sulphur Co., had been sold under foreclosure to Nacional Financiera SA, an agency of the Mexican Government for $2½ million, evidenced by promissory notes payable over 15 years. These assets include the Frasch process sulphur plant at San Cristobal on the Isthmus of Tehuantepec; the marine equipment used for inland transport of sulphur and capital stock of the company's subsidiary, Cia. Industrial de Istmo SA. The foreclosure became necessary when Cia Azufrera Mexicana, which received $5 million in credits from the above bank between 1951 and 1955, was rendered insolvent through the exhaustion of its sulphur reserves and its inability to acquire additional deposits within the area of the San Cristobal plant.

Element 102

Scientists at the University of California, Ghiorsa, Sikkeland, Walton and Glenn Seaborg, report that they have 'definitely discovered a short-lived isotope of element 102, nobelium'. But these workers state that they have not been able to duplicate the work of the international team who reported the discovery of element 102 in the summer of last year.

The new isotope has a half life of 3 seconds but has not been directly observed. It is postulated from the presence of fermium-250, its daughter atom, which has been identified chemically.

It is understood that the Stockholm group, who confirmed their original findings once, are likely to repeat the work when their cyclotron is working again after its present major overhaul.

French Competition Against Italian Sulphur

The report that the colossal natural-gas beds at Lacq will enable France to reach an output of 275,000 tons of sulphur a year by the end of 1958, has created a good deal of consternation in Sicily where it is feared that France will soon stop buying Italian sulphur. Imports of sulphur to France at present are at the rate of about 50,000 tons a year.

Canadian Peroxide Plant

Canadian Industries Limited, has opened its $3,000,000 plant at Hamilton, Ontario, to produce hydrogen peroxide. Chief use of the product is as bleaching agent in the textile industry, but it is also used to bleach paper and as a hair preparation.

Effects of End-Linking Polyethylene

AT the ACS Division of Physical and Inorganic Chemistry, a paper given by T. F. Williams, M. Dole and coworkers (*Chem. and Engng. News*, 1958, **36** No. 18, A2), indicated that radiosensitive groups in high polymers could disappear by a first order concentration relation. Gamma radiation was found to cause vinyl saturation at one end of a linear polyethylene chain to disappear (cross-link) at a rate proportional to the unsaturating concentration. In like manner, it has been observed that vinylidene unsaturation in a low density polyethylene and vinyl unsaturation in a Ziegler-type polyethylene disappear.

It is reported that the unsaturation disappearance mechanism could not be correlated with known effects of irradiation, such as hydrogen evolution, or by isomerisation to another type of unsaturated group. Also there was evidence that the free radicals produced were 'frozen' in the crystalline matrix.

The one possible mechanism suggested is that irradiation energy may excite the end vinyl group to a bi-radical. This, in turn, then reacts with a neighbouring chain to form an end-link, at a very low activation energy, it is thought.

Irradiation of Phillips Marlex 50 at room temperature has shown that the infra-red spectrum has a new absorption band at 10.1 microns. This band which has been tentatively assigned to cyclic structures, is believed to be due to cyclopentane or cyclohexane rungs. It does not disappear if the polyethylene is irradiated in a molten state at 140° C and then cooled to room temperature.

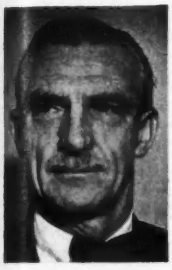
According to Williams *et al.* end-linking apparently changes polyethylene crystallinity on cooling after melting. Material irradiated at room temperature showed no change in crystallinity with irradiation up to 10^{18} m.e.v. per gramme. Definite decrease in crystallinity occurred, however, if a sample was irradiated, heated and cooled.

A relation between increase of amorphous content and number of cross and end-links formed by irradiation has been derived from which it is estimated that the degree of disorder introduced per branch is about 30 methylene groups.

People in the NEWS

● SIR DOUGLAS VEALE, CBE, until recently registrar at Oxford University, has accepted the chairmanship of a committee set up by the UK Atomic Energy Authority to advise on training in radiological protection. The committee includes: SIR ERNEST ROCK CARLING, consultant adviser to the Ministry of Health, Atomic Energy Authority and the Home Office; PROFESSOR W. V. MAYNEORD, director of physics department, Institute of Cancer Research, Royal Marsden Hospital; and PROFESSOR B. W. WINDEYER, Professor of Radiology (therapeutic) University of London.

● MR. JOHN BOULTON, manager of the research laboratories, Courtaulds Ltd., Droylsden, Manchester, was recently elected president of the Society of Dyers and Colourists. A graduate of Manchester University, Mr. Boulton joined Courtaulds in 1931. While at the university he began research into the physico-chemical principles of dyeing and continued this work at Courtaulds. In 1943 he was awarded the Gold Medal of the Worshipful Company of Dyers. Mr. Boulton was appointed manager of the new laboratories at Droylsden in 1946. Since then he has developed wet processing methods for Courtaulds' fibres alone and in blends with natural and other man-made fibres and has studied fibre behaviour during the dyeing and finishing processes. He was recently elected a vice-president of the Textile Institute.



John Boulton

● MR. S. H. ELLIOTT, managing director of H. J. Elliott Ltd., manufacturers of E-Mil laboratory glassware, was elected chairman of the South Wales and Monmouthshire branch, Incorporated Sales Managers' Association, at the recent annual meeting. At the end of this month he is to visit the company's stockists and distributors in Belgium, Holland and Germany.

● At the extraordinary general meeting of Gas Purification and Chemical Co., last week, it was announced that VICE-ADMIRAL SIR CHARLES HUGHES HALLETT and MR. W. J. ARRIS had been elected directors and that Sir Charles would be elected chairman. The previous president was MR. D. D. MATHIESON. MR. ROSSITER has relinquished the office of vice-chairman in favour of Mr. Mathieson.

● MR. J. S. SCHOFIELD, previously manager of the Chadkirk Dye Works of the Calico Printers' Association, has been appointed a member of the works executive. MR. K. TAYLOR has been appointed manager of Chadkirk in Mr. Schofield's place.

Mr. Schofield, who is 40, was educated at Repton School and Clare College, Cambridge, where he took an honours degree in organic chemistry in 1939, joining the Calico Printers' Association in the same year. After a works' training course at Broad Oak Works, Mr. Schofield joined research department, head office, where he worked until 1946 when he was transferred to the development laboratory at Broad Oak, becoming production chemist in 1947, and quality chemist in 1949. In 1952 he became manager of Dinting Vale Works, and was appointed manager of Chadkirk Dye Works in 1955.

Mr. Taylor took an honours degree in natural science at St. John's College, Oxford, in 1953. He joined the works' technical staff at Chadkirk, where he also had experience on the selling side. In 1956 he became an Associate of the Textile Institute, and in 1957 was appointed quality chemist at Chadkirk Dye Works.

● DR. D. H. BLACK has been appointed director of the Ministry of Supply's Armament Research and Development Establishment. He replaces MR. EWEN M'EWEN, who has left to take a post in industry.

● PROFESSOR J. L. M. MORRISON, professor of mechanical engineering at Bristol University, has been appointed chairman of the Advisory Council on Scientific Research and Technical Development by the Minister of Supply. He succeeds SIR ERIC RIDEAL, who has been chairman since 1953. New members of the council are SIR WILLIAM COOK, AEA; SIR IAN HEILBRON, late director Brewing Industry Research Foundation; PROF. W. T. J. MORGAN, deputy director Lister Institute and professor of biochemistry, London University; PROF. N. F. MOTT, Cavendish professor of experimental physics, Cambridge University; and PROF. L. ROSENHEAD, professor of applied mathematics, Liverpool University.

● MR. S. F. SMITH has been appointed sales manager of the industrial instruments division of Firth Cleveland Instruments Ltd., Treforest, Glam. Mr. Smith, who was previously with Philips Electrical Ltd., will operate from the sales department, Byron House, 7–9 St. James's Street, London SW1.

● MR. R. W. N. RUTTLEDGE, personnel manager of A. Boake, Roberts and Co. Ltd., is to present a paper on 'How our committees work' and will describe how his company revised its committee structure at a one-day conference on joint consultation, in industry. Organised by the Industrial Welfare Society this will be held on 12 June at Robert Hyde House, 48 Bryanston Square, London W1.

● MR. S. T. LUNT, B.A., received the Bowen prize of the Society of Instrument Technology at the annual meeting on 20 May for his paper on 'Process development and plant design—the role of instrumentation with particular reference to the application of computers'. This was presented by MR. P. GOUDIME, president, Scientific Instrument Manufacturers' Association.

● Officers for the Association of British Manufacturers of Agricultural Chemicals (ABMAC), formerly the Association of British Insecticide Manufacturers (see p. 952), for 1958–59 are as follows: *chairman:* MR. GEORGE HUCKLE, Shell Chemical Co. Ltd.; *vice-chairman:* MR. H. C. MELLOR, Bayer Agriculture Ltd., *hon. treasurer:* MR. H. J. JONES, O.B.E.; *hon. auditor:* DR. J. R. BOOER, F. W. Berk and Co. Ltd.; *executive committee:* MR. R. E. BERK, F. W. Berk and Co., Ltd., MR. A. W. BILLITT, Boots Pure Drug Co., Ltd., MR. E. T. BUGGE, Bugges Insecticides Ltd., MR. C. L. CHAFER, J. W. Chafer Ltd., MR. R. V. CRAVEN, W. J. Craven and Co., Ltd., MR. D. J. S. HARTT, May and Baker Ltd., MR. A. J. MARKS, A. H. Marks and Co., Ltd., MR. D. NAHUM, Pan Britannica Industries Ltd., MR. N. K. SMITH, The Murphy Chemical Co., Ltd.; *hon. vice-chairman:* MR. H. J. JONES, O.B.E.; *ex officio member of the executive committee:* MR. M. N. GLADSTONE, Fisons Pest Control Ltd.; *secretary:* MR. W. A. WILLIAMS, M.B.E.

R. A. Banks, ICI personnel director, with the Sir George Earle Trophy that he received on behalf of the company at the recent conference on industrial safety of the Royal Society for the Prevention of Accidents. The trophy is awarded each year for notable achievements in the cause of industrial accident prevention

● PROFESSOR A. D. MACDONALD, professor of pharmacology at Manchester University, who is chairman of the Franco-British Pharmaceutical Commission, and DR. A. C. C. NEWMAN, developments manager at the Wellcome Foundation Ltd., left for Paris on 22 May to fulfil their lecture programme at Strasbourg and Besançon. It includes addresses to Strasbourg faculty

of pharmacy and Besançon faculty of science, and an official dinner at Strasbourg. Professor Macdonald's subject is 'What's new', and Dr. Newman's 'The development of a medicine from the original research conception up to the stage of the final product'.

Sir Arthur Vere Harvey (r.) recently appointed chairman of Clayton Aniline Co. Ltd. and Clayton Dyestuffs Co. Ltd., presenting a gold watch to Mr. John Walker, senior departmental manager of the intermediates division, on completion of 25 years' service. A number of other long service employees also received similar gifts at the presentation, held on 19 May

● MR. G. S. BACHE was elected president of the British Chemical and Dyestuffs Traders' Association at the annual general meeting on 21 May. Other officers elected were: vice presidents, MR. C. W. LOVEGROVE, and MR. H. GILLIATT, chairman, MR. D. F. WAUGH, vice-chairman, MR. CHARLES FOUNTAIN, hon. treasurer, MR. KINGSLEY WILLIAMS, executive council, MR. L. A. QUICK (Langley, Smith and Co. Ltd.), BRIG. C. NORTON STAFFORD, C.B.E. (C. Tennant Sons and Co. Ltd.), MR. FRED WEIL (Joseph Weil and Son Ltd.), MR. C. H. WILSON (Cole and Wilson Ltd.), hon. auditor, MR. A. R. SPARROW.

● The seven successful candidates in the election to fill vacancies on the council of the Pharmaceutical Society of Great Britain were, in order of precedence, MR. W. JOHN TRISTRAM, Liverpool, a former president, who headed the poll; MR. W. T. ELDER, Aberdeen; MR. DONALD HUDSON, Hove, present president; MR. C. W. MAPLETHORPE, managing director of Allen and Hanburys Ltd.; MR. TOM REID, Haslemere; MR. MITCHELL JACKSON, Leeds; and MR. ERIC KENT, Sunderland.

● MAJOR FRANK H. BRAMWELL, a director of the Power-Gas Corporation Ltd., and Ashmore, Benson, Pease and Co. Ltd. since 1949, has died. Major Bramwell spent most of his working life with the Imperial Chemical Industries Ltd., becoming chief engineer of their general chemicals division.

● As chief executive, chemicals division of British Oxygen, DR. R. F. GOLDSTEIN, in addition to being managing director of British Oxygen Chemicals Ltd., is now also managing director of Carbide Industries Ltd. and a director of Odda Smelteverk.

● DR. J. H. WILKINSON, who is to succeed DR. A. C. C. NEWMAN as hon. secretary of the fine chemicals group, Society of Chemical Industry, is on the staff of the department of chemical pathology, Westminster Hospital, London SW1, and not of the Sunderland Technical College as stated last week.

● New chairman of Constructors John Brown and Co. is LORD ABERCONWAY. He succeeds SIR STANLEY RAWSON, who has relinquished the chairmanship but remains on the board. MR. ERIC MENSFORTH has been appointed deputy chairman and MR. JOHN A. R. STANIFORTH, a director, becomes joint managing director, with the present managing director, MR. R. M. WYNNE-EDWARDS.

Lead Welding with Oxy-Acetylene

THE techniques of lead welding are demonstrated in a new film made by British Oxygen Gases Ltd. Although it is intended as a guide to students on basic techniques and their applications, the film also illustrates some of the methods of production.

Applications for sheet lead welding in building, plumbing and chemical engineering are reviewed and the early history of jointing is shown. The major safety precautions which should be taken during the setting up of equipment are demonstrated.

Although the gases used for all demonstrations are oxygen and acetylene, the fact that other gas combinations can be used for lead welding is taken into account. Demonstrations cover all the basic techniques, including down hand butt and lap, inclined lap, vertical and horizontal vertical and fillet welding.

The film, entitled 'Welding of Lead Sheet', stresses that the small quantities of gas required for the welding of lead permit the use of low capacity cylinders and thereby increase the portability of equipment. The film, with a running time of 22 minutes, is obtainable on free loan from the sales technical service department of British Oxygen Gases, North Circular Road, London NW2.

Obituaries

The death has occurred at Darlington of MR. HAROLD COPELAND, a director of the Parkgate Chemical Works, Darlington, of Parkin, Ness and Co. He was 68 years old.

SIR MICHAEL KROYER-KIELBERG, honorary president and founder of the United Molasses Co., died in London on Monday this week, aged 76. In 1915 he formed the British Molasses Co., and in 1920 the Pure Cane Molasses Co. The present United Molasses Co. was founded in 1926 through a merger of the two concerns, and Sir Michael became chairman and managing director. He retired from the chairmanship and board of United Molasses in 1953.

Market Reports

Pressure for Farm Chemicals Eases

LONDON There has been little change in the volume of activity on the industrial chemicals market and while new business has been on a moderate scale the movement against existing commitments continues to cover good quantities. Price conditions throughout are maintained on a steady basis.

Some easing of the pressure for agricultural chemicals has been reported but the trend is a seasonal one. Export trade interest is fairly widespread over most sections of the market and the flow of enquiry, particularly for Commonwealth destinations, has been satisfactory.

Creosote oil and the cresylic acids continue to be in active request on an otherwise quiet coal-tar products market. Pitch is moving well on home account and there is a fair enquiry for the light distillates.

MANCHESTER Although less active than it was a short time ago in some sections, the contract movement of heavy chemicals to consumers in the Lancashire and West Riding areas during the past week has been on a fair scale. Among one or two other industrial outlets, the demand from the textile and allied industries leaves room for improvement and there seems to be little prospect of this developing for the present at all events. A moderate flow of fresh enquiries has been dealt with during the past few days. Pressure for supplies of fertilisers is now showing the normal seasonal contraction.

GLASGOW Business was more favourably maintained in the Scottish heavy chemical market, particularly towards the end of the week. The quantities demanded were at the usual normal levels against current requirements. Although some sections of industry are still showing a slight decline, continued activity is still prevailing in agricultural chemicals, with quite a volume of enquiries being received. Prices for the most part showed little change, and remained fairly firm. In the export market, the position also shows little change, still continuing at a good level.

British Hydrocarbon Chemicals

The information that a low-pressure polyethylene plant to produce 11,000 tons a year was in the planning stage was inadvertently given against the name of Grange Chemicals Ltd. in the list of Scottish chemical plants in CHEMICAL AGE, 3 May, p. 815. This plant is the project of British Hydrocarbon Chemicals Ltd. as was correctly stated in p. 814 of the same issue.

In a further reference to the new polyethylene and cumene-phenol plants of British Hydrocarbon Chemicals at Grangemouth, in p. 826, it was stated that the cumene process started with 'propylene and propane'; the words 'and propane' should have been omitted.

Dynamic Control May Replace Independent Automatic Systems

THE new dynamic control of plant in the process industries, a development still in its infancy, was referred to by Sir Harold Hartley, president, Society of Instrument Technology, in his presidential address at the annual meeting on 20 May. Sir Harold said that hitherto control had been exercised almost entirely by a number of independent automatic controllers having some combination of the proportional, integral and derivative actions, each controller operating through the measurement of a single variable which it maintained at a set value based mainly on previous experience.

But the rapid measurement of the composition variables now opened up the possibility of the dynamic control of a plant similar to that of a guided missile, when the various factors influencing its performance were integrated by a special purpose computer. The control of chemical compositions was, however, a much more complex task than that of a machine, where each of the physical characteristics was susceptible to a direct single control.

The adjustment of chemical composition for instance would involve a number of independent variables, such as temperature, pressure, time of residence, catalyst activity and feedstocks, and the optimisation of the conditions in the plant. Clearly progress in that direction would depend on the investigation of the dynamic characteristics of the processes concerned in which instrumentation must play a major part.

Self-Optimising System

The possibility of devising a self-optimising system had been greatly advanced by recent developments in data processing equipment. The growing complexity of plants and the increasing number of automatic control loops had led to the need for a centralised control room which had in addition to the conventional instrument panels, a data logger or perhaps a scanning system, to draw attention to the off-normal values. The data logger, in addition to checking each signal against high and low limit signals and indicating off-normal values, would record the output data in digital form, thus acting as a central recorder to the existing control loops.

The immediate problem on which progress would depend was the investigation of the response of the system to disturbances of various kinds with a view to optimising its performance. For that the data logger, or a multi-channel high-speed recorder were essential tools. Theory alone was unlikely to provide the answer as chemists were accustomed to deal with steady states, but a knowledge of the kinetics and thermodynamics involved would indicate the most likely line of attack.

The analysis of the results of data-logging over a period offered one possibility of discovering co-ordination between the variables, but it might be too restricted in its range. Introducing known disturbances was the most hopeful method of attack, but it would not appeal to the plant operator, though the resulting gain might be very large.

Adding that simplified computers for future systems of dynamic control had still to be designed, probably of a mixed analogue-digital type, Sir Hartley said, 'The field is wide open and I suggest that progress will depend on co-operation between the industrial users, who alone possess the operating experience and opportunities, and the instrument-makers who provide the tools.'

Runcorn Chemical Industry Featured in Museum

A PERMANENT exhibition dealing with the Runcorn chemical industry is on view in the ICI room of the Runcorn Museum. The room was formally handed over to the council on 8 May. The display shows how the early Leblanc soda system gave way in the 20th century to the new electronic industry which grew up at Weston Point. Photographs are shown of the early works and of the pioneers of the chemical industry. Alongside pictorial representations are shown the raw materials handled by Runcorn chemical works, finished products and examples of the uses of chemicals in daily life. On an intricate chart is depicted how over 130 products are made.

Will

COL. HUGH LLOYD HOWARD, M.C., T.D., of Pettitts Hall, Chigwell, Essex, a director of Howards and Sons Ltd., Ilford, who died on 10 October last, left £44,184 net.

'Largest-ever' Stainless Steel Crystalliser Installed in US

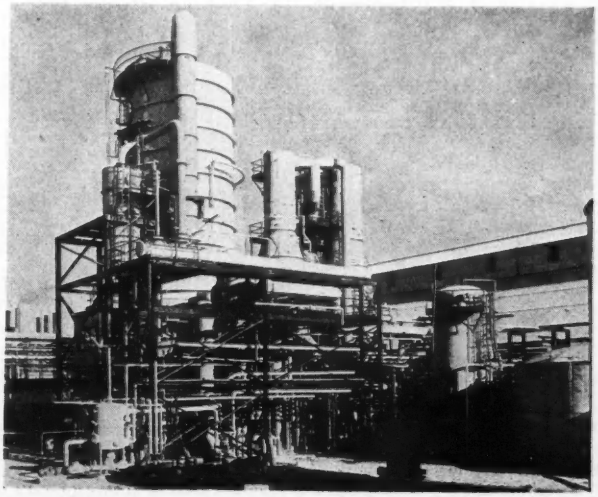
WHAT is believed to be the world's largest stainless steel crystalliser, weighing more than 150 tons with a height of 82 ft. and a diameter of 20 ft., was recently completed in the US. Made by Struthers Wells Corporation, Warren, Pennsylvania, it is being used to make daily more than 300 tons of ammonium sulphate.

The stainless steel plates for the huge crystalliser were supplied by Allegheny Ludlum Steel Corporation and are of type 316. This steel is noted for its resistance to corrosion, and is well suited for use with ammonium sulphate. After the crystalliser was completed, it was shipped in sections to Hopewell, Virginia, where it was erected for use by the National Aniline Division of Allied Chemical and Dye Corporation.

The manufacturer reports that it will be less expensive to make the fertiliser in one large crystalliser than in a number of smaller tanks. National Aniline reports that a more uniform crystal particle is obtained with the new equipment.

The crystalliser was designed by a team of specialists at Struthers Wells, and a pilot plant crystalliser was utilised to test the new design features of the big equipment. Special liquids that were to be used in the completed crystalliser were tested in the pilot plant.

Inside the crystalliser thousands of gallons of liquid circulate through pipes, holed plates and plain vat-like enclosures. The entire mass of liquid is kept at 150°F, and as it moves from one stage to another, both up and down in the crystalliser, 'certain liquids' are added to aid the crystallising action. The water vapours are drawn off and condensed, the entire process being continuous.



Stainless steel crystalliser for ammonium sulphate production is claimed to be world's largest

Commercial News

Reichhold Chemicals' Satisfactory Results despite a Difficult Year

A VERY difficult year was experienced by Reichhold Chemicals Ltd. owing to the effect of the Suez crisis in the early months of 1957 and the continued credit squeeze, followed by increasing competition, coupled with a substantial increase in wages and establishment charges generally. In spite of these difficulties, however, expanded sales had produced satisfactory results.

Profits of the group for the year ended 31 December 1957, before taxation, after charging for depreciation £81,521 (£62,412) and directors' remuneration, £32,653 (£32,557), were £316,334 compared with £305,213 in 1956. Taxation based on profits for the year is £177,931 as against £165,461. Profits of the group for the year after taxation (of which £138,240 is dealt with in the accounts of the parent company) (1956 £139,702) are £138,403 (£139,752). The balance, after deduction of profits retained by subsidiaries £52,310 (£52,147), available for appropriation by Reichhold Chemicals is £149,124 (£150,330). Unappropriated profits carried forward are £9,677 (£10,884). A further £75,000 is to be placed to general reserve.

Payment of a final dividend of 10 per cent and a cash bonus of 2½ per cent has been recommended on the ordinary shares. With the interim dividend of 7½ per cent already paid, this makes a total dividend of 17½ per cent and a total distribution of 20 per cent (same as last year).

Chairman, Mr. Walter Breuer, in his statement, reports that the phthalic anhydride plant has been in full operation since July last year. As was to be expected with new chemical plant, certain 'teething' troubles arose. However, with the able technical co-operation of their US, French and German associates, these have been overcome so that it is expected that a satisfactory profit will be derived from this plant from January of this year.

The Vinyl and Vinatex Companies are stated to be rapidly expanding and have now 13 licensees manufacturing their products overseas, which are providing an increasing source of revenue. The Beck Koller Co. are increasing their plant capacity to meet an increasing demand for their products. Sales of polyester resins in the reinforced plastics field are also increasing satisfactorily and it is expected that further improvements and developments of new types will reflect an accelerated expansion.

APV Co.

Sales for the first quarter of 1958 by the APV Co., Crawley, group designers and manufacturers of process plant, stainless-steel equipment, etc., have not been as good as the directors would wish. A definite slowing down in business activity at home and abroad has been noted. Chairman, Dr. K. J. S. Seligman, however, is still hopeful that the 'many steps' taken to meet the more difficult trading conditions will result in an improvement in results for the current year.

Despite an increase in orders in 1957, group turnover, excluding inter-company sales, was slightly below £5.7 million, compared with nearly £6 million. Sales of the parent company were £200,000 down at £3.5 million. Net profit, however, was appreciably better. Profits from overseas subsidiaries were lower, and the Canadian company incurred a loss of £47,000. Group net profit was £99,226 (£101,328).

No ordinary dividend is being paid due, the chairman explains, to inadequate cover available and the 'importance of maintaining reserves'.

Associated Lead

Wholly owned subsidiary of Goodlass Wall and Lead Industries, Associated Lead Manufacturers last year had a profit of £935,000 (£1,053,000), less tax of £457,000 (£627,000). Net profit is £478,000 (£426,000). The interim dividend, free of tax, is the same as for the previous year. No further dividend is being recommended.

F. W. Berk

Sales of F. W. Berk and Co. Ltd., for the year ended 31 December 1957, showed an increase of nearly six per cent, while the profit for the group had increased from £115,147 to £149,371, reported Mr. A. D. Berk, the chairman, at the annual general meeting. However, while the increase in profit before tax was £106,971, of this taxes took £72,747, i.e. 68 per cent of the increased earnings.

Benefits expected from the Sandridge Laboratories have been realised. Although Leda Chemicals Ltd. had only been acquired towards the end of the first half of 1957, satisfactory earnings by this company have already been shown.

Abbey Chemicals Ltd. continued to move from development into production, and are expected to earn net profits this year. Satisfactory progress is also reported for the associated companies Detarex Ltd. and Berk Exothermics Ltd.

Boots Pure Drug Co.

An increased dividend, higher profits, and one-for-four free share issue, have been announced by Boots Pure Drug Co. Ltd. Distribution has been raised from a total of 16 per cent to 18 per cent with a final 12 per cent.

After appropriate depreciation on latest values (£576,875 compared with £312,379 last year) pre-tax profits are shown to have increased from £4,553,998 to £5,178,510, and tax takes £3,013,667 against £2,643,671, to leave group net profit at £2,095,176, compared with £1,990,028 in the year to 31 March last.

Profits have borne the cost of an extension of the staff bonus scheme. Long-service employees are now to get an extra three weeks' pay.

The one-for-four free issue proposed has yet to receive CIC consent. If approved it will rank for all future dividends.

British Xylonite

For the British Xylonite Co. Ltd. the year 1957 was a better year than 1956. Group sales to external customers amounted to £11 million, an increase of 10 per cent over last year. Gross profit before tax was a record at £1,090,557 compared with £743,855 last year. This is stated by chairman Sir Laurence Merriam to be partly due to the increased sales, and also to the reduction of costs brought about by large capital expenditure of recent years. Taxation took £613,000 leaving group net profit of £477,557 of which British Xylonite's share was £296,450. Capital expenditure was over £500,000 but does not include heavy capital expenditure by associated companies.

Reporting on the Cascelloid division, Sir Laurence stated that the year's results have been good with progress in both

Continued on next page

ICI Revalue Assets £70m. Higher

A FURTHER £70 million has been added to the total of Imperial Chemical Industries Ltd.'s assets at £396 million by a revaluation made at 1 January last. The new figures will be incorporated in the 1958 accounts. This news was disclosed by Sir Alexander Fleck, chairman of ICI, at the 31st annual general meeting last Thursday.

As a result of this revaluation, the total depreciation on these assets in 1958 will rise by about £2 million. The revaluation has been conducted on the same basis applied for revaluation in 1950.

On the current business outlook, conditions have varied with the industries served by the company, but taking the general position, home sales turnover for the first few months of 1958, said Sir Alexander, 'has not been unsatisfactory'. Export conditions in the same period have become 'considerably more difficult'. Despite this, however, sales are running 'reasonably close to last year's'.

Sir Alexander explained the change to be made in the method of calculating the employees' profit sharing. Instead of the bonus being fixed as a percentage of remuneration based on the dividend percentage, the total sum to be shared as bonus by the employees will be a fixed percentage of the total gross amount paid as dividends or interest on the ordinary preference loan stocks and any other form of capital.

ICI's results for 1957 were given in CHEMICAL AGE, 5 April, p. 643.

sales and profits. Sales of collapsible plastics tubes, which reached commercial success in 1956, are increasing, and the production of polyethylene bottles has continued at a high level.

BX Plastics had a successful year. Sales increased by 20 per cent compared with 1956, resulting in higher profits. During the year a new plant for terpene resins came into operation. Part of the nitrocellulose plant was adapted for production of lacquer grade nitrocellulose.

Sales of the Expanded Rubber Co. decreased but profits were well maintained.

A considerable programme of work is stated to be in hand to increase laboratory facilities to study the possibilities of irradiation methods as applied to plastics.

Catalin Ltd.

Manufacturers of plastics, Catalin Ltd., had a group net profit for 1957 of £17,469 (£15,031) after tax of £18,231 (£12,861). The sum of £10,000 (same) is being put to general reserve. A dividend of 7½ per cent (6 per cent) has been recommended.

Greeff-Chemicals

A 20 per cent expansion in group profits is reported by Greeff-Chemicals Holdings. Group profits increased from £128,034 to £186,163. Tax absorbs £98,795 (£63,375), leaving a net profit of £87,368 against £64,659. Revenue reserves receive £5,000 more at £20,000 and ordinary dividends take £61,813 (£46,000).

A final dividend of 11 per cent is announced, together with a 4 per cent bonus on £550,000 ordinary shares for 1957. The 5 per cent interim was paid on £500,000. The 1956 total was 16 per cent on the smaller capital.

Hilger and Watts

In exchange for the issue of 40,000 5s ordinary shares Hilger and Watts, scientific instrument makers, have taken over the whole of the capital of Collimator Cases, makers of precision woodwork.

Permutit Co.

Net profit of the Permutit Co. Ltd. for 1957 is £210,945 (£248,663) and of subsidiaries £96,042 (£25,324). Net current assets are £1,283,346 (£1,257,268). Capital commitments are £57,000 (£30,000).

A dividend of 15 per cent (same) has been recommended.

The company propose to increase authorised ordinary capital from £750,000 to £1.25 million by creation of a further two million 5s ordinary shares. There is no intention of issuing additional shares in the immediate future.

Tharsis Sulphur

Pyrites trade was not as active as they would like it, said Mr. W. P. Rutherford, chairman of the Tharsis Sulphur and Copper Co. Ltd. Producers had deemed it necessary to lower their export sales prices, and since 1956 the reductions amounted to 22 per cent. Largest buyer of the company's pyrites was the Spanish chemical trade and the price of pyrites delivered in Spain was controlled and did not cover all costs.

Initial sales of Tharsis Sulphur's mineral was made on a basis of its sulphur content and had therefore to be competitive with elemental sulphur coming from the US and Mexico and now from natural gas being produced at Lacq, France. After extraction of sulphur, a high content iron ore remained together with the associated metals. This constituted an important rebate to the buyer, said Mr. Rutherford, so that should the price of sulphur be reduced the company would be less severely affected than producers of elemental sulphur.

Mineral containing 1 per cent and over of copper was marketed as cupreous pyrites and shipped to Western Germany. The residue was treated by the Duisburger Kupferhütte and the Tharsis Sulphur's portion of copper extracted was returned by Tharsis Sulphur to Spain, thus providing the company with an extra source of revenue. Their present mining programme was therefore aimed at maintaining or increasing their output of cupreous pyrites.

It was not doubted that demand for sulphuric acid would continue to increase. At present, however, the potential production of sulphur in elemental form, in pyrites or from natural gas, was greater than demand. Looking ahead, the chairman suggested that it would appear that a gradual readjustment of European markets by transatlantic sulphur producers would be necessary.

William Blythe

Group trading profit of William Blythe and Co., chemical manufacturers, is reported by the chairman., Mr. W. Collison, to be comparable with that of 1956, in spite of increasingly difficult trading conditions.

Payment of a final dividend of 20 per cent on the ordinary shares is recommended which together with the interim already paid of 5 per cent makes a total distribution of 25 per cent, the same as last year.

The new sulphuric acid plant at the Hapton Works is now operating, and the introduction of modern mechanical and electrical aids to greater efficiency and increased productivity is continuing throughout the company.

British Benzol

British Benzol and Coal Distillation announce that due to a serious reduction in the inland demand for coke of all grades and the cessation of exports since February, the plant has been working under capacity and at a loss. In respect of trade investment the company has received a capital dividend of £30,022, which it is intended to place to capital reserve account, and a special revenue dividend of £35,832 less tax.

For the year to 31 October 1958 an unchanged interim dividend of 5 per cent is declared. In 1956–57 a total dividend of 15 per cent was paid.

INCREASES OF CAPITAL

J. K. Innes and Co Ltd., chemical engineers, etc., 4 Laws Lane, Scotch Street, Carlisle. Increased by £10,000 beyond the registered capital of £15,000.

Laboratory Thermal Equipment Ltd., Greenbridge Lane, Greenfield, nr. Oldham. Increased by £20,000 beyond the registered capital of £5,000.

Mayborn Products Ltd., Dylon Works, Berrymans Lane, London SE26. Increased by £101,500 beyond the registered capital of £1,000.

Midland Acid Co. Ltd., sulphuric acid makers and manufacturing chemists, etc., Pye Bridge, Derby. Increased by £34,900 beyond the registered capital of £40,100.

Sir William Burnett and Co. (Chemicals) Ltd., Great West Road, Isleworth, Middx. Increased by £8,990 in £1 ordinary shares, beyond the registered capital of £1,010.

COMPLETE EDITION

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LONGMANS

NEW PATENTS

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 18 June

Process for the production of uranium. Spedding, F. H., Wilhelm, H. A., and Keller, W. H. **796 589**

Mixing valve device for cold water and hot water. Cooper, F. C. **796 865**

Apparatus for the addition to or abstraction from bulk quantities of material of other quantities. Smith, W. G., and Provan, A. L. **796 866**

Polymerisation products. Peterlite Products, Ltd. **796 867**

Titanium alloys. Jessop & Sons, Ltd., W. **796 781**

Promoting the flow of molten metals on metal surfaces. English Electric Co., Ltd. **796 682**

Preparing oximes by reduction of nitro-cycloparaffins. Imperial Chemical Industries, Ltd. **796 726**

Apparatus for compressing a coating of comminuted material around a preformed core. Evans Medical Supplies, Ltd. **796 810**

Production of aluminium sulphate. Sulphates, Ltd. **796 856**

Production of curly fibres. Owens-Corning Fiberglas Corp. **796 876**

Catalysts and catalytic reactions. Chempatents, Inc. **796 653**

Production of an aminoplast precondensate for the treatment of cellulosic textile materials. Courtaulds, Inc. **796 815**

2-keto-l-gulonic acid. Pfizer & Co., Inc., C. **796 817**

Antitussive compositions. Merck & Co., Inc. **796 731**

Inhibitors of oxidation, peroxidation and polymerisation. Imperial Chemical Industries, Ltd. **796 603**

Production of mixed fertilisers. Chemische Werke Albert. **796 860**

Lubricant compositions. California Research Corp. **796 732**

Organic isothiocyanate and fungicidal compositions containing same. Boots Pure Drug Co., Ltd. **796 754**

Extrusion of polytetrafluoroethylene. Resistoflex Corp. **796 583**

Esters of α- β-ethylenically unsaturated acids. Celanese Corp. of America. **796 820**

Luminescent materials. Cole, Ltd., E. K., and Evans, J. N. I. **796 654**

Production of silicon dioxide. British Titan Products Co., Ltd. **796 735**

Sulphonyl cyanamide compounds. Farbenfabriken Bayer AG. **796 697**

Ethylene polymerisation process. Imperial Chemical Industries, Ltd. **796 728**

Trisazo dyestuffs. Cassella Farbwerke Mainkur AG. **796 790**

Filters. Walters, G. **796 631**

Gas purifiers. North Western Gas Board. **796 632**

Production of glycan poly-(sulphuric acid esters). Hoffmann-la Roche & Co., AG. **796 737**

Gas separator for fuel decanting installations. Jordan, W. **796,886**

Aromatic nitriles and imides. Distillers Co., Ltd. [Cognate applications 32107 and 1794.] **796 765**

Monoazo dyestuffs of the benztriazole series and metal complexes thereof. Farbenfabriken Bayer AG. **796 738**

Fluid supply apparatus. British Petroleum Co., Ltd., and Brear, N. H. **796 793**

Chromane derivatives. Distillers Co., Ltd. **796 794**

Anti-freeze mixtures. Pilgrim, L. **796 633**

Methods of and machines for the production of microporous plates of a plastic substance. Compagnie de Caoutchouc Manufacture Dynamic. **796 612**

Condensation products from hydrocarbons or derivatives thereof and carbohydrate-like materials. Universal Oil Products Co. **796 739**

Separation and recovery of volatile sulphides from sulphide materials. Noblitt, H. L. **796 741**

Hydrolysis process for the manufacture of amines. Imperial Chemical Industries, Ltd. **796 796**

Manufacture of 5, 6, 21-trihalogenopregnanes and products obtained thereby. Schering Corp. **796 767**

Preparation of metal cyanates. Ethyl Corp. **796 637**

Preparation of phthalonitriles. Distillers Co., Ltd. **796 766**

Alkyl-substituted acetyl indanes. Givaudan & Cie. Soc. Anon., L. **796 585** **796 586**

Alkyl substituted thiotic acids. American Cyanamid Co. **796 894**

Fluorescent lamps and powders. Ateliers de Constructions Electriques de Charleroi. **796 658**

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Producing selenium rectifiers. Standard Telephones & Cables, Ltd. **796 896**

Solid fuel distillation plants including ancillary equipment. Sulzer Frères Soc. Anon **796 618**

Bleaching cellulose and textile materials. Deutsche Gold- Und Silber-Scheideanstalt Vorm. Roessler. **796 619**

Monoazo dyestuffs containing urea residues and metal complexes thereof. Farbenfabriken Bayer AG, **796 747**

Method of and apparatus for extracting aromatic products. Soc. d'Exploitation des Brevets Alce. **796 712**

Manufacture of high linear polyesters. British Celanese, Ltd. **796 621**

Preparation of high molecular weight linear polymers of formaldehyde. Du Pont de Nemours & Co., E. I. **796 862** **796 863**

Separation of poly-isopropylbenzenes from mixtures by distillation. Mid-Century Corp. **796 715**

Fluid dispensing container closures. Abbott Laboratories. **796 799**

Production of linear polycondensates and polymers, from which can be produced threads and fibres with reduced electrostatic charging. Vereinigte Glanzstoff-Fabriken AG. **796 800**

Converting optically active aminodiols into racemic aminodiols. Soc. Farmaceutici Italia. [Addition to 766 682.] **796 857**

Plasticised hydrolysed ethylene vinyl ester polymer. Du Pont de Nemours & Co., E. I. **796 899**

Production of shaped articles and filling materials of porous styrene polymers. Badische Anilin- & Soda-Fabrik AG. **796 623**

Grates for fluidised layer reaction chambers. Badische Anilin- & Soda-Fabrik AG. **796 753**

Stabilisation of ozone. Olin Mathieson Chemical Corp. **796 644**

Preparation of 1-(p-nitrophenyl)-2-acylamidopropane-1, 3-diols. Chinoin Gyogyszer es Vegyeszeti Termekek Gyara. **796 961**

Salts of phosphoric acids and compositions containing the same. Monsanto Chemical Co. **796 903**

Polymerisation products of olefine hydrocarbons. Badische Anilin- & Soda Fabrik AG. **796 903**

Production and improvement of leather and skins. Badische Anilin- & Soda-Fabrik AG. **796 905**

N, N¹-di-substituted amides of aryl acetic acids. Aktiebolaget Pharmacia. **796 839**

Esters of cyclic hemi-acetals. United States Rubber Co. **796 906**

Recovery of sulphur dioxide from gas mixtures containing same. Cathala, M. E. I. **796 755**

Burning of limestone. Solvay et Cie. **796 722**

Preparing silica-alumina catalyst. Grace & Co., W. R. **796 756**

Densifying spongy metals. Sylvania Electric Products, Inc. **796 907**

Puncture-sealing composition and tubeless tyre containing same. General Tire & Rubber Co. **796 908**

Purification of organic acids. Imperial Chemical Industries, Ltd. [Cognate application 38380.] **796 909**

Electrolytic process for obtaining rare earth elements. Horizons, Inc. **796 645**

Silicone rubber adhesive sheet and tape materials. General Electric Co. **796 911**

Polymerisation products from olefinically unsaturated hydrocarbons. Badische Anilin- & Soda-Fabrik AG. **796 912**

Synthesis of carotenoids. Hoffmann-la Roche & Co., AG. **796 575**

Process for surface treatment of finely divided oxides or mixtures of oxides. Deutsche Gold- und Silber-Scheideanstalt Vorm. Roessler. **796 646**

Cobalt-containing dyestuffs of the benzene-monoazo-aminocrotonic acid arylide series. Farbenfabriken Bayer AG. **796 723**

Contacting solids with gaseous fluids. Esso Research & Engineering Co. **796 914**

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TRADE NOTES

Padley and Venables Ltd., of Suprex Works, Livery Street, Birmingham, are shortly removing to new and larger premises at Middlemore Lane West, Aldridge, Nr. Walsall. The new works are of modern single storey construction, situated on the Redhouse Industrial Estate.

Vacu-blast Ltd. have moved to new combined offices and works at Bath Road, Slough, Bucks.

New Plant Planned

Clensol Ltd., chemical engineers, 40 Berkeley Square, London W1, have had plans prepared for the early construction of a new factory on the Hainault Industrial Estate, Dagenham, Essex.

Appointed Q and Q Distributors

Townson and Mercer Ltd., of Croydon and Edinburgh, have been appointed official home market distributors and stockists by Quickfit and Quartz Ltd.

New Polyurethane Foam

The addition of polypropylene glycol 2000 to the line of urethane-grade polyethers made by the Wyandotte Chemicals Corporation of the US is announced by Jacobson van den Berg and Co. (UK) Ltd., 3/5 Crutched Friars, London EC3. This material (PPG 2000), of interest to many industries, is said to have low, uniform water content; low volatiles and ash content; good colour; and low terminal unsaturation. Used alone or in conjunction with other polyols and additives it will produce flexible foams with low compression set, high tensile elongation and resiliency.

British Cellophane to Move

British Cellophane Ltd. are moving into new London offices on 14 July. Their address will be Henrietta House, 9 Henrietta Place, London W1 (telephone: Museum 8311). The building, now nearing completion, will house all BCL staff at present in 12–13 Conduit Street and 20 Savile Row, W1. London staff of Colodense Ltd. and Bonded Fibre Fabric Ltd., associated companies of BCL, will also move to this address. In a demonstration room visitors will be able to study the applications of cellulose, polyethylene and polyethylene-coated Cellophane films in packaging.

Mullard Valve Division

Mullard Ltd., Mullard House, Torrington Place, London WC1, have set up a new Government and industrial valve division which will cover electron optical devices, receiving valves, special industrial valves, and transmitting and microwave valves.

Simple Viscometer for Paste Production

WHEN modified the Ford cup viscometer is stated by British Geon Ltd. to be a simple and robust instrument which is suitable for use with p.v.c. pastes. When the orifice of a No. 4 Ford cup viscometer is enlarged the instrument can be used to determine the viscosity of p.v.c. pastes, and gives results reproducible within the limits required by reproduction work.

The modified viscometer differs from the standard instrument only in the size of the orifice, the diameter of which has been increased to 0.2188 ± 0.0005 in.

All viscosity tests should be conducted at a standard temperature, usually 23°C. The viscometer is filled with the sample under test and stirred for 10 seconds prior to testing. This stirring will minimise errors due to thixotropy but it is important to standardise the method of stirring. The sample is then allowed to flow into a 100ml. measuring cylinder and the time required to collect 50ml. is recorded. Air entrapped during the passage from the viscometer to the collecting cylinder introduces a small error which may be neglected in production work.

Density is determined by weighing a known volume of paste at 23°C in a measuring cylinder. Viscosity is calculated as follows:

$$\text{Viscosity (centipoises)} = \frac{\text{Flow (in seconds)} \times \text{Density}}{0.0266}$$

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A good honours degree, or equivalent, in Chemistry or Chemical Engineering and a number of years' experience in a responsible position in industrial research, development or production operations are essential. Experience of radio-chemical processes would be an advantage.

Salary assessed within scale £1,790-£2,080.

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Send postcard for application form, quoting reference 2430, to Recruitment Officer, U.K.A.E.A., I.G.H.Q., Risley, Warrington, Lancashire. Closing Date: 2nd June, 1958.

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ENGINEER (Qualified) required to handle important coal treatment project for well-known firm of gas engineers. Application, which will be treated in strict confidence, should state age, qualifications, experience and salary required. Please apply to Box No. 3612.

APPLICATIONS are invited from graduate chemical engineers with previous industrial experience to work as project engineers on the development and execution of substantial contracts at home and abroad. Details must be given of previous experience which should preferably be in the field of nitrogen fertilisers with an emphasis on high pressure work. The position is one of responsibility and of interest to engineers preferably between 28 and 35 years old. Salary commensurate with age and experience. Apply: The Power-Gas Corpn. Ltd., Stockton-on-Tees.

SITUATIONS VACANT: continued

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